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Conflict, cooperation, and viability interstate water resources and domestic water use in the Middle East

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THESIS

CONFLICT, COOPERATION, AND VIABILITY: INTERSTATE WATER RESOURCES AND DOMESTIC WATER USE IN THE MIDDLE EAST

by

James F. Hopp

March 2010

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The Middle East is a region of vital interest, not just to the United States, but also to the entire world. It is also an area of severe water scarcity. Due to a variety of factors, the demand for water in the Middle East is rapidly increasing, placing additional stress on already constrained water supplies. Because water has no substitutes and is an important part of economies, culture, security, and life itself, it is not surprising that many warn of impending wars over water. However, conflict over scarce water resources is not the only possible outcome. Cooperation between states to share the benefits of this increasingly precious commodity is not only another possibility; it is the more likely outcome. Wars fought over water are very unlikely to end successfully for any participant, with the costs far outweighing any benefits, while cooperation maximizes the benefits from a limited resource. While interstate war over water is unlikely, water could still cause issues internal to Middle Eastern countries. Without proper management practices and forward-looking policies, lack of water could lead to internal conflicts, which could cause significant unrest in the region.

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CONFLICT, COOPERATION, AND VIABILITY: INTERSTATE WATER RESOURCES AND DOMESTIC WATER USE IN THE MIDDLE EAST

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LIST OF ACRONYMS AND ABBREVIATIONS

CENTCOM	United States Central Command
GAP	Southeastern Anatolia Project (Turkish: Guneydogu Anadolu Projesi)
GCC	Gulf Cooperation Council
JTC	Joint Technical Committee
m^3	Meters Cubed
mm	Millimeter
PKK	Kurdistan Workers' Party (Kurdish: *Partiya Karkeren Kurdistan*)
UAE	United Arab Emirates
UN	United Nations

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I. THESIS INTRODUCTION

This thesis seeks to answer the question of whether scarce water resources in the Middle East may lead to interstate friction or, alternately, cooperation. The Middle East region is one of the most water-starved areas on Earth. Expanding populations promise to strain the already severely limited resources, potentially to the point that violent competition over possession of water will occur. Central to this question is an examination of current thinking on resource scarcity, as well as the relations among those states that share waterways and the degree to which these states have successfully addressed any differences over access to this critical resource. This thesis examines the relationships of states that share major sources of water in the Middle East, to determine whether their shared water sources may lead to conflict in an attempt to exploit the water to fill their own needs or, alternatively, cooperation to divide the shared benefits the resource can offer.

Additionally, this thesis considers the current viability of water utilization practices of regional states. Attempts to make the desert bloom with nonindigenous, relatively water intensive vegetation, and expansion of populations further into areas devoid of natural water resources, are examples of current practices in the Middle East that already are straining available resources. A rapidly rising population and expanding middle class only promise to further increase tensions and stress resources. This examination establishes the foundation for understanding the degree of stressed water resource levels, and begins to lay the groundwork to recommend practices that would make better use of the scarce water in the region.

A. IMPORTANCE

The Middle East is a region of great economic, strategic, cultural, and religious importance to the entire world. It is uniquely important as the seat of three major religions and the cradle of civilization. Geographically, the Middle East is located at the crossroads between Europe and Asia, where trade and investment are of vital importance. The vast oil and gas reserves contained in the region form the backbone of modern

economies. As the home of rogue states, state sponsors of terrorism, and numerous terrorist groups, the region has the potential to harm international interests regionally as well as at home. The significance of this is that conflicts over resources could have serious consequences not just in the region itself, but for the entire world.

Current conflicts over resources, and the potential of future conflicts in response to increasingly scarce supply of these resources, have been an area of intense study.[1] While competition for nonrenewable resources such as diamonds, oil, and copper has caused extreme and violent conflicts between various groups and nations, and promises to do the same into the future, the treatment of water as a commodity has differed. While violent conflicts involving water certainly have occurred, there also has been a history of shared utilization of water resources to the benefit of all those involved. An examination of conflict and cooperation over water in the Middle East will shed some light on whether water is actually different from other resources.

While the Middle East is a region that is particularly starved of water resources and tends to share the vast majority of water across national boundaries, from the standpoint of potential conflict over water, it is not unique. There are more than 260 international rivers, traversing almost half the nations in the world, and this number continues to rise as more countries are created.[2] In the next 30 years, 50 countries, home to more than 3.3 billion people, could face serious water shortages.[3] In this sense, the Middle East serves as a testing ground for what the rest of the world may expect when water shortages inevitably occur. If scarce water resources in the region lead to conflict, the entire globe may inevitably be consumed with disputes over water. If, however, water scarcity leads to Middle-Eastern cooperation, models for future joint efforts will be created.

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[1] Attention to this idea has been widespread in scholarly publications, mainstream movies, the news, blogs, and every other form of communication.

[2] Aaron T. Wolf, "Conflict and Cooperation along International Waterways," *Water Policy* 1, no. 2 (1998): 251.

[3] Don Hinrichsen and Henrylito Tacio, "The Coming Freshwater Crisis is Already Here," *Woodrow Wilson International Center for Scholars: Environmental Change and Security Program*, http://www.wilsoncenter.org/topics/pubs/popwawa2.pdf (accessed Feb 07, 2011), 2.

B. PROBLEMS AND HYPOTHESIS

Current resource scarcity theory makes dire predictions about growing populations and increased incomes causing an ever-rising demand for resources that have a finite supply. Since water is essential for agriculture, industry, and basic human survival, it is understandable that nations would view access to and possession of water as part of their vital national interests and, therefore, worth fighting for. However, water has the potential to have a character different from other resources. While fighting over diamonds, oil, and the like, has clear historical examples, water has been treated differently, with examples of past cooperation seeming to be just as prevalent as conflicts.

Examination of the potential for conflict or cooperation over water resources necessarily implies assessment of examples of both of these possibilities. In order to analyze interstate illustrations on the prospect of either conflict or cooperation, this thesis looks at the relations between states that share major waterways in the Middle East. This thesis also examines current water management strategies and their potential viability in order to examine the possibility for domestic conflicts or cooperation.

This paper finds that, on the whole, competition over water resources is more likely to lead to cooperation for the shared benefit of those involved rather than violent conflict. Research reveals that there are numerous and varied examples of nations working together in order to ensure their access and use of water. While disputes over water are somewhat common, they seldom lead to violent conflict. Where violence has broken out, it is likely that water concerns are not the primary cause. Instead, it may be a secondary cause or just the excuse needed to act on existing tensions. Additionally, this thesis reveals that current water management strategies in the Middle East are on the whole inefficient and not viable into the foreseeable future. This misuse of water, if it continues, will further stress water supplies. Although this in itself would not necessarily be the primary cause of future conflicts, it could be the spark that is needed to ignite existing tensions between nations or within societies.

C. THESIS OVERVIEW

The remainder of this thesis is organized into five chapters consisting of a general explanation, case study analyses, and results and conclusions. Chapter II lays the analytical framework. It explores the current state of water resource supply and use, starting with a world view and narrowing to the Middle East. Next, international norms and agreements on how water is, and is supposed to be, shared, are examined. From there, resource scarcity theory, especially in regard to how it applies to water, is analyzed. The views of both optimists and pessimists are investigated and explained with the Middle East region as the backdrop for this analysis. Chapter II concludes that although water resources are currently under stress, and will become more scarce in the future, cooperation is more likely than conflict over these limited resources.

The following three chapters are case studies utilizing the theories and data developed in Chapter II to further examine the main questions asked in this thesis. Chapter III is a case study of the conflict and cooperation between the states that share water within the Jordan River basin. As an area in which several nations share the same primary source of water, and where much of the world's attention has been focused for more than the past 50 years, much literature and scholarship is devoted to the ideas of conflict and cooperation in this basin. Specifically, the cases of the 1967 war, the Palestinian Intifada, and more modern peace agreements are examined to show that water has largely not been a source of conflict and, instead, has fostered cooperation. For reasons similar to those in Chapter III, the Chapter IV is a case study of the riparians along the Tigris/Euphrates river basins. The main cases investigated in this chapter are the wars that never happened, despite the intense friction between Turkey, Syria, and Iraq.

Chapter V also is a case study, covering the internal water management strategies specific to the Gulf Region of the Middle East. Primarily composed of oil rich states with authoritarian governments, this case examines the management practices of the wealthiest states that are able to implement strategies they see fit without requiring the wider consent of their populations. Additionally, the Gulf countries form a suitable area in which to study domestic water management strategies because they have among them

the highest environmental adaptive capacity in the world, while facing a critical risk factor for freshwater scarcity.[4] These states will be able to provide the maximum range of possibilities in the arena of water management. This chapter concludes that, while many of the management strategies in the region have been unnecessary and inefficient—at times even detrimental—water can be managed effectively even in the most arid conditions. Current water practices in the area are unsustainable, however, and could lead to unrest and instability.

The sixth and final chapter consists of the conclusion and recommendations. This chapter succinctly and specifically details the findings of the thesis. It summarizes the various case studies in light of the analytic framework established in the second chapter demonstrating that scarce water resources can, and do, often lead to cooperation to the mutual gain of all parties involved. Additionally, it takes the lessons learned from the various cases to make recommendations to further encourage collaboration to ensure the highest value is achieved from scarce water resources.

[4] James A. Russell, "Environmental Security and Regional Stability in the Persian Gulf," *Middle East Policy* XVI, no. 4 (Winter 2009): 90–101, 91 and 96.

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II. WATER BACKGROUND: USE, SHARING, AND POTENTIAL CONFLICT

The wars of the next century will be fought over water.

—Ismail Serageldin[5]

There is little doubt that the Middle East is short of water, but sadly, suffers from no shortage of conflict. The region is, as a whole, one of the most water-starved areas on the planet and is well known for its long history of violent conflict both within and among states. Additionally, as an area of great importance due its geographical location, oil reserves, and other factors, it is not surprising that much has been written about water and conflict in the region. This chapter reviews the relevant literature in order to set the framework for the analysis that follows. The general patterns of water's availability and uses are first established to provide context for the region. From there the two dominant, but competing, views of water's role toward fomenting violent conflict and as a pathway for peace are examined. These competing views can be characterized as water pessimists and water optimists, and the analysis of these views makes up the bulk of the chapter.

A. WATER AVAILABILITY AND USE

The vast majority of the earth's surface is covered by water. However, this does not necessarily mean that plentiful water is available for our use. More than 97 percent of the world's water is contained in the oceans. Of the approximately 2.5 percent that remains, a large portion is frozen in ice caps and glaciers. More water is contained within other sources that are inaccessible or impractical. What remains for human use, as drinkable water from renewable sources such as runoff from rivers and lakes and the amount stored by dams, is only about one-hundredth of one percent of all the earth's water.[6] Additionally, this water is by no means evenly distributed around the world.

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[5] Ismail Serageldin, *Water*, http://www.serageldin.com/Water.htm (accessed Feb 26, 2011).

[6] Barbara Rose Johnston and John M. Donahue, "Introduction," in *Water, Culture, & Power: Local Struggles in a Global Context*, ed. John M. Donahue and Barbara Rose Johnston, 1–8 (Washington, DC: Island Press, 1998), 1.

The amount of available freshwater varies greatly from state to state, and is sometimes difficult to measure. While specific water resources, like rainfall and river flow, can be easily measured and accounted for, sources such as soil water and so-called "virtual water" are almost impossible to track effectively, and make overall water accounting problematic.[7] However, it is estimated that 60 percent of the world's available freshwater supplies are located in just nine countries scattered around the globe.[8] Additionally, while the Middle East and North Africa contain only 1 percent of global freshwater supplies, they account for more than 5 percent of the world's population.[9] This is why, even though some experts say the supply of fresh water is more than adequate to meet the needs of the world's current population; some regions suffer from serious water deficiencies.[10]

The relative deprivation of certain nations or areas is often expressed by noting a country's water "stress" or "scarcity." Water scarcity is a general concept and is the point where water demands by all sectors cannot be fully met due to the total demand of users impinging on the supply or quality of available water.[11] For specific points of reference, these terms are measured by analyzing the annual water supplies available per capita expressed in meters cubed (m^3). A nation is said to be experiencing water stress when this number is below 1,700 m^3, water scarcity when the number is less than 1,000 m^3 and absolute scarcity when the number is below 500 m^3.[12] As a whole, the Middle East and North Africa have a renewable average annual water supply per capita is

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[7] Tony Allan, *The Middle East Water Question: Hydropolitics and the Global Economy* (New York, NY: I.B. Tauris & Co Ltd, 2000), 33.

[8] "For Want of a Drink," *The Economist: A Special Report on Water*, May 22, 2010: 1.

[9] Nils Peter Gleditsch, Kathryn Furlong, Havard Hegre, Bethany Lacina and Taylor Owen, "Conflicts over Shared Rivers: Resource Scarcity or Fuzzy Boundaries," *Political Geography* 25, no. 4 (May 2006): 363.

[10] Sandra L. Postel, "Entering an Era of Water Scarcity: The Challenges Ahead," *Ecological Applications* 10, no. 4 (Aug 2000): 941.

[11] "Water Scarcity," *United Nations: Water For Life, 2005–2015*, http://www.un.org/waterforlifedecade/scarcity.html (accessed Feb 7, 2011).

[12] "Water Scarcity," *United Nations*.

1,100 m^3.[13] This number does not tell the full story, however. Even within the region, there are incredibly wide variations in water supply. While Iraq has access to 3,077 m^3 per person per year of renewable water resources, Kuwait has just 8 m^3.[14] Overall, the Middle East is the most concentrated area of water scarcity in the world.[15]

While water scarcity is clearly a function of the available water supply, other factors must also be taken into account. Scarcity can also be a product of changing population sizes, water management policies and projects, climate change, cultural traditions, historical uses, economic output, state relationships, power politics, and many other factors. While some of these factors can only be explained in more general terms, several, such as population growth, usage statistics, and management policies can shed light on the growing water scarcity problem with data. Over the course of the last 30 years, the population in the Middle East and North Africa has more than doubled.[16] This does not mean, however, that the demand for water has merely doubled as a result. In fact, in the last century, as the world's population tripled, water use has grown at more than twice that rate.[17] Rising populations, combined with rising incomes and the associated demand for increasingly exotic, and more water-intensive products, explains why water demands increase at a greater rate than population. While only 2–3 liters of water a day are required per person for drinking water, the demands for other needs are much higher. Worldwide, about 20 percent of water is used for domestic and industrial needs, 10 percent for power generation, and 67 percent for agriculture.[18] In the Middle East, the agricultural demand is even more dramatic, with approximately 80 percent of all

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[13] The World Bank, "Making the Most of Scarcity: Accountability for Better Water Management Results in the Middle East and North Africa," *The International Bank for Reconstruction and Devlopment*, 2007, http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2007/10/10/000310607_20071010141136/Rendered/PDF/411130was390400Englishoptmzd.pdf (accessed 7 2011, Feb), 139.

[14] Ibid., 142.

[15] Sandra Postel, *Last Oasis: Facing Water Security* (New York, NY: W. W. Norton & Company, 1997), 29.

[16] World Bank, "Making the Most of Scarcity," 151.

[17] UN Water, "Coping with Water Scarcity: Challenge of the Twenty-First Century," *2007 World Water Day*, Mar 22, 2007, http://www.fao.org/nr/water/docs/escarcity.pdf (accessed Feb 7, 2011), 10.

[18] "For Want of a Drink," *The Economist*, 2.

water being used to support agriculture.[19] Increased urbanization and dietary changes place increased demand on the agricultural sector, and will increasingly stress those areas, like the Middle East, that use a large portion of their water to grow food. Additionally, water management practices can further exacerbate the problem. Great inefficiencies in the use and allocation of water in the region are created through heavy subsidies on water for agricultural purposes, even in water scarce areas, for products that are relatively water intensive.[20]

B. HOW WATER IS SHARED

The background given above shows how water is used and that, although water is abundant in the world, in certain areas such as the Middle East, accessible and usable water can be very scarce. In addition to the hydrologic and economic issues already discussed, there are also important political factors that deal with the amount and condition of available water. Chief among these issues is that political boundaries often have little to do with the naturally occurring water supply sources and that the taking of water on one side of a border can significantly affect those on the other side.[21] For these reasons, the international system has developed principles, treaties, laws, and cooperation with regard to shared water resources. While approximately 295 agreements have been negotiated and signed over a wide range of water issues throughout the world's 263 international river basins since 1948, this thesis only examines the overarching principles and most major agreements in order to provide a top-level analysis of how water resources are, and are intended to be, shared.[22]

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[19] Jeremy Berkoff, "A Strategy for Managing Water in the Middle East and North Africa," The International Bank for Reconstruction and Devlopment, The World Bank (Washington, DC, 1994), 12.

[20] Aaron T. Wolf, "Middle East Water Conflicts and Directions for Conflict Resolution," *2020 Vision Briefs* (International Food Policy Research Institute), no. 31 (1996), 11.

[21] Ewan W. Anderson, "Water: The Next Strategic Resource," in *The Politics of Scarcity: Water in the Middle East*, ed. Joyce R. Starr and Daniel C. Stoll, 1–22 (Boulder, CO: Westview Press, 1988), 2.

[22] Meredith A. Giordan and Aaron T. Wolf, "The World's International Freshwater Agreements," *Program in Water Conflict Management and Transformation*, http://www.transboundarywaters.orst.edu/publications/atlas/atlas_html/interagree.html (accessed Feb 07, 2011).

Because water flows without respect to cartographic boundaries, and the actions of one riparian can affect another, the problems of sharing international waterways often boil down to the issue of territorial sovereignty. General principles for deciding sovereignty over water resources are recognized and are widely employed by the international community to settle or prevent international conflicts over shared water resources. In principle, each state has complete sovereignty over a basin located within its territory; each state along a shared resource has equal rights to its use as its neighbors upstream and down; all states are allowed to share in exploiting the basin's water; and a state's sovereignty is restricted to just and equitable use of the river's water.[23] While the first principle recognizes a nation's sovereignty above all else, the others all involve some sort of limit on a state's actions. Clearly, while the first principle does not lend itself to agreements, and the others restrict sovereignty to some degree, agreements on water within the general international framework require that countries give up some of their freedom of action in order to be successful. However, other principles that do not necessarily deal with sovereignty can also be used, including the mutual use, linkage, and image principles.[24] Mutual use is the idea that a nation may require compensation in order to forgo some of its use of a shared resource. The linkage principle is that countries may request other benefits to share water. The idea of image is that one state may cooperate with another in order to make its neighbor look more positively at them. These principles are more likely to be used when nations seek to gain from limiting their own actions.

Beyond generally accepted international principles that normally govern states' behavior, there have been several attempts made to refine the principles of international water sharing. Among the most prominent of these measures are the Helsinki Rules of 1966 on the Uses of the Water of International Rivers, and the United Nations'

[23] Arnon Soffer, *Rivers of Fire: The Conflict over Water in the Middle East*, trans. Murray Rosovsky and Nina Copaken (Lanham, MD: Rowman & Littlefield Publishers, Inc., 1999), 9–11.

[24] Ibid., 11.

Convention on the Law of the Non-Navigational Uses of International Watercourses.[25] The Helsinki rules focused on equitable utilization of shared water resources, listed relevant factors to be considered for this equity, and outlined means to resolve disputes.[26] In a more formal manner, the United Nation's Convention confirmed the idea of equitable utilization, created its own means of conflict resolution, obliged riparians not to cause each other harm, established joint management mechanisms, and other measures.[27] In addition to these large-scale ideas, regional organizations have also taken it upon themselves to further encourage cooperation through the creation of region-specific guidelines.[28] At a more micro level, basin-wide treaties have been established that create shared interests among the riparians and can be used for making further treaties that meet their specific needs.[29]

While international principles, rules, treaties, organizations, and agreements may have some success at preventing or controlling water disputes, they do not solve the problem of shared water resources. The simple fact remains that nations do not usually willingly give up their sovereignty, or limit their own actions, without something to gain.[30] Simply put, "international law does not have the power to solve international river conflicts."[31] The Helsinki rules merely provide guidelines adopted by the International Law Association, which have no means of enforcement. The UN's

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[25] Giordan and Wolf. "World's International Freshwater Agreements." http://www.transboundarywaters.orst.edu/publications/atlas/atlas_html/interagree.html (accessed Feb 07, 2011).

[26] International Law Association, "The Helsinki Rules on the Uses of the Waters of International Rivers," *United National Economic Commission for Europe*, http://www.unece.org/env/water/meetings/legal_board/2010/annexes_groundwater_paper/Annex_II_Helsinki_Rules_ILA.pdf (accessed Feb 07, 2011).

[27] General Assembly of the United Nations, "Convention on the Law of the Non-Navigational Uses of International Watercourses: 1997," *United Nations Treaty Collection*, http://untreaty.un.org/ilc/texts/instruments/english/conventions/8_3_1997.pdf (accessed Feb 07, 20100).

[28] Giordan and Wolf, "World's International Freshwater Agreements."

[29] Ibid.

[30] This is a Realist view of international relations whose ideas can be found in Realist literature, but the idea was most prominently orignially put forward in Hans Morgenthau, *Politics Among Nations: The Struggle for Power and Peace* (New York, NY: Columbia University Press, 1959), 4–13.

[31] Soffer, Arnon. *Rivers of Fire: The Conflict over Water in the Middle East.* Translated by Murray Rosovsky and Nina Copaken. (Lanham, MD: Rowman & Littlefield Publishers, Inc., 1999), 14.

Convention on International Watercourses took 27 years to adopt, and has still not been ratified by the overwhelming majority of UN members. Regional groups and more specific basin treaties also regularly run into problems of enforcement, vague language, and varied interpretations. While the possibility of cooperation over water certainly exists, so too does the opportunity for conflict. It is to these two possibilities that this paper now turns.

C. WATER PESSIMISTS

With the idea in mind that large-scale international agreements may not be able to control water disputes, water pessimists generally argue that tension over shared water resources is likely to lead to conflict. Pessimists tend to follow the ideas classically laid down in the tone of the dismal science, namely that population growth will eventually outpace the availability of resources, with the result being misery and vice.[32] In this case, vice is conflict and misery is the reduction in population below that point at which water is too stressed. Presently, pessimists believe that "conflict over critical water supplies is an ever-present danger."[33] Because water is an essential element of human life, competition for limited supplies can cause states to see water as a fundamental issue of national security.[34] As limited supplies continue to be stressed, there will be increasing incidence of violent conflict with water scarcity as its root cause.[35] Even where cooperation over water resources exists, for pessimists, these agreements are infrequent, fragile, and subject to the future instability of the relationships between partners.[36]

While the pessimists' concern about resource scarcity and environmental scarcity, often is applied broadly to different resources and various regions, the combination of

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[32] Thomas Robert Malthus, "Essay on the Principle of Population," *Ebrary*, 1798, http://site.ebrary.com/lib/nps/docDetail.action?docID=2001605 (accessed Aug 29, 2010), 11.

[33] Michael T. Klare, *Resource Wars: The New Landscape of Global Conflict* (New York, NY: Owl Books, 2002), 139.

[34] Peter H. Gleick, "Water and Conflict: Fresh Water Resources and International Security," *International Security* 18, no. 1 (Summer 1993): 79–112.

[35] Thomas F. Homer-Dixon, *Environment, Scarcity, and Violence* (Princeton: Princeton University Press, 1999), 4.

[36] Michael T Klare, "The New Geography of Conflict," *Foreign Affars* (Council on Foreign Relations) 80, no. 3 (May-June 2001): 49–61, 58–59.

water scarcity and the Middle East provides a particularly potent blend of pessimistic worst-case scenarios. Water, especially in the Middle East, can be viewed in part as both a renewable and nonrenewable resource. Water, in its most commonly perceived and discussed form, is renewable, in that surface water, like flowing rivers, is recharged through the normal hydrologic cycle. A substantial portion of the water used by several Middle Eastern nations, however, comes from nonrenewable groundwater, such as fossil aquifers.[37] Unlike oil, or other resources for which wars have been fought, water has no substitutes, and no country, or person, can exist without it. Of the three types of resource scarcity, supply-induced, demand-induced, and structural, Middle Eastern water has features of all of them.[38] It is supply-induced because nations taking larger shares of river flows lower the quantity and quality of water available to others; demand induced because populations and changing tastes are raising demands for water; and structural because as one state takes more water, other states get less. Additionally, where conflicts occur in regions that already have heightened tensions and a history of violence, such as the Middle East, the situation is less likely to be contained.[39] Even though some scholars note that the environment is only one potential variable that can cause conflict, combined with other political, economic, and social causes, several regions in the Middle East already have situations that are near conflict.[40] Clearly when scarcity-bred conflict is involved, water demand in the Middle East provides fertile ground for discord.

Because water is important in culture, religion, nutrition, health, the proper functioning of the economy, and ensuring national security, the ramifications of securing water are reflected in each nation's economic, legal, technological, security, and environmental policies.[41] Four out of these five policy focuses, and the ones that are likely to be acted on by political leaders, increase the chances that the pursuit of water

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[37] World Bank, "Making the Most of Scarcity," 143.

[38] Homer-Dixon, *Environment, Scarcity, and Violence*, 48.

[39] Gleick, "Water and Conflict," 95.

[40] Thomas F. Homer-Dixon, Jeffrey H. Boutwell and George W. Rathjens, "Environmental Change and Violent Conflict," *Scientific American*, Feb 1993: 38.

[41] Mostafa Dolatyar and Tim S. Gray, *Water Politics in the Middle East: A Context for Conflict or Co-operation* (New York, NY: St. Martin's Press, 2000), 15–17.

will lead to conflict. From the security perspective, water resources affect a nation's security and even its very survival.[42] Because water can be a source of economic or political strength, ensuring access to water provides a justification for war; denying the enemy's access becomes a primary objective during conflict.[43] From the economic viewpoint, water is essentially just like any other required good, and should be priced according to its value.[44] While this outlook may appear relatively benign, when combined with the security imperative, economics may also lead to violent conflict. Just as it has in the past, the security and prosperity of nations relies on its successful participation in the world's economy.[45] In fact, security and economic interests are deeply intertwined, and water is a vital resource to maintain and continue any sort of functioning economy. Effectively pricing water could actually exacerbate the situation further, as increasing demands are placed on water-stressed nations leading a desperate state to attempt desperate measures. The legal framework has already been discussed, but it is worth repeating that legal regimes to maximize the use of shared water resources require established rights to the water and flexibility in their use.[46] Neither of these factors is present in the Middle East, and the legal perspective is unlikely to solve major issues. The technological framework generally states that there is a sufficient quantity of water to satisfy global needs as long as appropriate technology is available.[47] However, those who develop the appropriate technology may develop a large gap between the water "haves," and "have nots," which could present another type of potential water conflict.

It is not just the classic interstate war to secure resources that could be a cause of violent conflict over dwindling water supplies. In addition to the scarcity-induced war between states, Homer-Dixon identifies four other possible types of violent conflict

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[42] Dolatyar and Gray, *Water Politics in the Middle East,* 19.

[43] Gleick, "Water and Conflict," 84

[44] Dolatyar and Gray, *Water Politics in the Middle East,* 23.

[45] Klare, *Resource Wars,* 7.

[46] Dolatyar and Gray, *Water Politics in the Middle East,* 32.

[47] Ibid., 40.

arising from resource scarcity.[48] These include disputes over environmental degradation, ethnic clashes from migration or social cleavages, civil strife, and conflicts between the developed and developing world.[49] The majority of these potential conflicts are social in nature, which can sometimes have useful effects. Especially in authoritative or repressive states, like many Middle Eastern countries, social change can be a reason to rally, distribute land and resources more efficiently, and incite institutional reforms. However, scarcity itself, the reason for the conflicts, can also reduce the capacity of a nation to achieve any real changes, leading to a negative spiral.[50] Additionally, some argue that even local instability can escalate to the international level of conflict, and possibly from there to international violence.[51]

Resource pessimists paint a grim picture for the future in a world of increasing water scarcity. As scarce water resources become more precious, violence and conflict become more likely. Viewed through different lenses, equitable water distribution despite increasing scarcity may not continue to be assured through mechanisms outside of violence. However, resource optimists look at the same data, trends, and systems and see a completely different result. For optimists, increasingly rare water resources are likely to lead to cooperation for their shared use instead of conflict over their dominion.

D. WATER OPTIMISTS

While resource optimists acknowledge that supplies may become increasingly scarce as populations and demands grow, they generally feel that wars over water are rare and unlikely.[52] Optimists argue that in potential conflicts over water, the cost of the fight would far exceed any benefits received and could destroy shared infrastructure essential to both sides, whereas the benefits of cooperation to all parties are clear.[53] As a result,

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[48] Homer-Dixon, *Environment, Scarcity, and Violence*, 5.

[49] Ibid.

[50] Ibid.

[51] Gleick, "Water and Conflict," 81.

[52] Steve C. Lonergan, "Water and Conflict: Rhetoric and Reality," in *Environmental Conflict*, ed. Paul F. Diehl and Nils Peter Gleditsch, 109–124 (Boulder, CO: Westview Press, 2001),118–119.

[53] Simon Dalby, "Environmental Insecurities: Geopolitics, Resources, and Conflict," *Economic and Policial Weekly* 38, no. 48 (Nov 29–Dec 5 2003): 5073–5079, 5077.

interstate wars over scare resources are not likely.[54] Even in those instances where water plays an important role in conflicts, water is more likely simply a tool of the conflict, target of aggression, or victim of the fighting.[55]

Water pessimists do not necessarily state that violent conflict is inevitable, but they do tend to classify certain conditions as having a higher probability of leading to war than others. Normally, the strongest case for an impending conflict is where a downstream riparian that is heavily dependent on the water from an upstream nation is much stronger militarily than its upstream neighbor. However, optimists point to the idea that there is very little evidence that Israel, which fits this description well, has any link between hydrologic and military decision-making.[56] In fact, far from heading toward conflict, Israel is perhaps the best example in the region of a state that has managed its water with some reasonable amount of efficiency.[57] Water consumption has declined significantly, due in large part to the intentional slowdown of agricultural use, in an Israeli effort to preserve its environmental integrity as an alternative to conflict.[58]

To understand the view of the optimists, it is important to comprehend an important perspective on scarcity that optimists bring to the table. Apart from simply a security, economic, technological, or legal viewpoint, optimists promote an environmental outlook to examining water. From the more "dark green" perspective, pushing green policies can help to correct humanity's misguided behavior toward the environment.[59] Less extreme, and more realistic from an international relations standpoint, is the optimists' perspective that our world has finite and limited resources.[60]

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[54] Homer-Dixon, *Environment, Scarcity, and Violence*, 5.

[55] Aaron T. Wolf, "Trends in Transboundary Water Resources: Lessons for Cooperative Projects in the Middle East," in *Water Balances in the Eastern Mediterranean*, ed. David B. Brooks and Ozay Mehmet, 137–156 (Ottowa, ON: International Development Research Centre, 2000), 140.

[56] Ibid., 139.

[57] Jan Selby, "The Geopolitics of Water in the Middle East: Fantasies and Realities," *Third Wold Quarterly* 26, no. 2 (2005): 329–349, 333.

[58] Harvey Lithwick, "Evaluating Water Balances in Israel," in *Water Balances in the Eastern Mediterranean*, ed. David B. Brooks and Ozay Mehmet, 29–59 (Ottowa, ON: International Development Research Centre, 2000), 46.

[59] Dolatyar and Gray, *Water Politics in the Middle East,* 47.

[60] Ibid., 48.

Since resources are limited, in the long run there is little benefit to be had from fighting over them. Instead, the greatest gains come from cooperation. While subscribers to the environmental perspective claim their view requires an alternate and new view of national security, the reality is that this view of national security is already in place in much of the world. Many nations already recognize a more broad interpretation of national security where economics, resources, and other variables are of the utmost importance, and have for some time.

It is illuminating to look at data that supports the optimistic point of view. While conflicts over resources have certainly occurred, mostly in developing nations, those states with significant "lootable resources," like diamonds and precious metals, are significantly more likely to experience war than other nations.[61] However, water is not easily lootable as it is expensive to transport and requires significant development to properly exploit, so nations with water resources are not necessarily more prone to wars. Looking at the more than 400 international crises that took place between 1918 and 1994, only seven were in any way related to water and there were only four wherein any violence took place, and no wars were ever fought over water.[62] While some research has shown that competition over resources, including access to freshwater resources, can have a positive correlation with civil war and armed struggle, this correlation is not particularly strong, and it may in fact be that the conflict is caused by external variables, and it is not clear that freshwater is the driver of conflict.[63] Meanwhile, in the 20th century, almost 150 treaties have been concluded about water as a resource.[64] In fact, looking more closely at some of the very cases often cited as water conflict reveals that they in fact result in close cooperation.[65]

Although many treaties have been concluded with regard to water resources, there are also many more levels of international cooperation with respect to water. There have

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[61] Klare, *Resource Wars*, 13.

[62] Wolf, "Trends in Transboundary Water Resources," 139.

[63] Wenche Hauge and Tanja Ellingsen, "Casual Pathways to Conflict," in *Environmental Conflict*, ed. Paul F. Diehl and Nils Peter Gleditsch, 36–57 (Boulder, CO: Westview Press, 2001), 50–53.

[64] Wolf, "Trends in Transboundary Water Resources," 138–143.

[65] Ibid.

been numerous industrial cooperation agreements involving water, and more than 200 of cultural or scientific support.[66] Clearly, cooperation over water has been of great importance. This is not only because the two parties gain the water benefits of their agreements, but the cooperation itself also holds value. Once meaningful relationships between nations are established, there is an immense benefit to both nations in continuing the relationship. Conflict would disrupt the dealings of the cooperating nations, making the potential benefits to military victory not worth the cause of the break in the relationship.[67] Additionally, since the effective exploitation of water resources usually involves large-scale projects, much time and money often are devoted to large hydrologic systems such as dams, water carriers, power stations, and others. In conflict, these would become high-priority targets. Even if a water war were successful to achieve additional resources, the physical costs to both sides would likely be much larger than any rewards.

E. CONCLUSIONS

Water pessimists and optimists look at the same conditions and draw completely different conclusions. Whereas water is plentiful in many regions, parts of the world are severely handicapped in their possession of this valuable resource. Water stress can be a result of many variables, including supply, demand, and management. No matter the cause, the situation puts strain on the nations that have water scarcity. Large-scale efforts, such as the Helsinki Rules and UN Convention on the Law of the Non-Navigational Uses of International Watercourses, designed to prevent the outbreak of, or control the hostilities within, conflicts that involve water, have been largely unsuccessful because they lack enforcement mechanisms and the support of those they are supposed to govern. Given these factors, pessimists see that water scarcity will lead to conflict while optimists feel the result will be cooperation.

While both points of view certainly make abstract and theoretical sense, the reality of the situation is that pessimists see the situation too narrowly and the optimists'

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[66] Aaron T. Wolf, "When International Water Becomes a Global Challenge," *University of California, Riverside: Water Science and Policy Center*, http://wspc.ucr.edu/Wolf.pdf (accessed Feb 07, 2010).

[67] Stephen G. Brooks, *Producing Security: Multinational Corporations, Globalization, and the Changing Calculus of Conflict* (Princeton, NJ: Princeton University Press, 2005). 161.

view more accurately describes the water-scarce world. Collected real-world data support the contention that cooperation occurs more often than conflict. While small scale and internal conflicts may show a positive relationship as resource scarcity rises, the correlation is not strong and could, in fact, be due to other variables. Granted, pessimists do not necessarily maintain that conflict is ongoing or inevitable in the near future. Instead, they constantly warn of the increased chances of conflict in the future. However, these claims have been made for decades. Specifically, with regard to water and the Middle East, claims of a coming water crisis and the violence it would entail have been long predicted. The only thing that changed as time has gone by is the decade, or century, in which this coming crisis is predicted to occur. Meanwhile, as the optimists expect, as water as grown increasingly scarce, the amount of cooperation between nations has increased.

Additionally, the pessimistic outlook on the relationship between water resources and security is too narrow to explain the current workings of the international world effectively. National security, as well as economic prosperity, is greatly interdisciplinary. Focusing on only the individual aspects of acquiring or losing access to certain freshwater resources does not go nearly far enough in explaining the causes of conflict. While water may be a target for destruction, an objective of war, or an excuse to raise tensions, wars are not fought over water. Instead, there is much to gain for nations from cooperating to share their scarce water resources, while any violent conflict over these resources is likely to have a much higher cost than any possible water benefit that could be achieved.

III. THE JORDAN RIVER BASIN

> *Like all wars in the political and strategic reality of our times, wars over water do not solve anything.*
>
> —Shimon Peres[68]

With the framework of analysis now set with regard to water conflict and cooperation, this paper now turns to examine specific regions in the Middle East. The first region that is considered is the Jordan River basin. While the Jordan River basin is relatively small on the world scale, covering only 18,300 square kilometers, it has drawn the attention of much of the world for a large part of the last century.[69] The Jordan River is the smallest watershed shared by more than two countries in the Middle East and has been at the center of major international conflicts. Among the water-strained Middle East region, it is the most frequently cited as a cause of conflict and most likely source of a coming water war.[70] However, while there has certainly been no shortage of international conflicts in the basin, water shortages have not been their cause. Instead, this chapter demonstrates that water needs did not play a substantive role in any interstate violence in the region, and instead have played a significant role in fostering cooperation between nations.

A. HYDROLOGY

Israel, Syria, Lebanon, Jordan, and the Palestinians share the waters of the Jordan. However, their individual conditions and their dependence on the Jordan vary significantly. The Jordan River is made up of four main tributaries that have their origins in four different countries. The Upper Jordan is generated by three spring-fed tributaries:

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[68] Quoted in "Integrated Water Resources Management and Security in the Middle East," in *Proceedings of the NATO Advanced Study Institute on Integrated Water Resources Management and Security in the Middle East*, ed. Clive Lipchin, Eric Pallant, Danielle Saranga and Allyson Amster (Kibbutz Ketura, Israel: Springer, 2007), 190.

[69] Peter Beaumont, "Conflict, Coexistence, and Cooperation: A Study of Water Use in the Jordan Basin," in *Water in the Middle East: A Geography of Peace*, ed. Hussein A. Amery and Aaron T. Wolf, 19–44 (Austin, TX: University of Texas Press, 2000), 19.

[70] Dolatyar and Gray, *Water Politics in the Middle East*, 85–86.

the Hasbani in Lebanon, the Banias in Syria, and the Dan in Israel, which is the largest tributary.[71] The Upper Jordan flows south into the Sea of Galilee. From there, 10 kilometers south of the Sea, the Jordan River is met by the Yarmouk River, which has its sources in Syria and Jordan.[72] Additionally, the Jordan picks up water from springs and other more minor tributaries before emptying into the Dead Sea. Further complicating matters is the fact that, for the Jordan as a whole, Syria and Lebanon are upstream of Israel, which is an upper riparian to Jordan, while for the Yarmouk, Syria is upstream of Lebanon, which is upstream of Israel.[73]

Despite the fact that Lebanon and Syria border the Jordan and contain the sources of significant contributions to the river, they do not rely much on its waters. Only about 5 percent of the total water demand of both Syria and Lebanon is supplied by the Jordan River.[74] Syria can meet the majority of its water demands from the Euphrates River, while Lebanon contains several internal rivers and a high rate of precipitation that can supply its needs. In contrast, Jordan uses the Jordan River to supply the majority of its water needs, while Israel uses the Upper Jordan alone for about one-third of its consumption, accounting for up to 90 percent of its flow.[75], [76]

While surface water may be the most easily observable water in the Basin, there are other sources as well. Groundwater, in general, tends not to cross national boundaries and traditionally is used by local populations.[77] However, it makes up the majority of total water used and withdrawn in the region.[78] While there are many sources of

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[71] Dolatyar and Gray, *Water Politics in the Middle East*, 89.

[72] Aaron T. Wolf, *Hydropolitics Along the Jordan River: Scarce Water and its Impact on the Arab-Israeli Conflict* (Tokyo: United Nations University Press, 1995), 7.

[73] Selig A. Taubenblatt, "Jordan River Basin: A Challenge to the 1990's," in *The Politics of Scarcity: Water in the Middle East*, ed. Joyce R. Starr and Daniel C. Stoll, 41–52 (Boulder, CO: Westview Press, 1988), 43.

[74] Dolatyar and Gray, *Water Politics in the Middle East*, 90.

[75] Ibid.

[76] Masahiro Murakami, *Managing Water for Peace in the Middle East: Alternative Strategies* (Tokyo: United Nations University Press, 1995), 73

[77] Allan, *Middle East Water Question*, 81.

[78] Wolf, *Hydropolitics Along the Jordan*, 9–12.

groundwater, the ones of primary interest here are those whose recharge or discharge crosses boundaries. West of the Jordan River, three aquifers are the primary sources of water; and these basins for the most part recharge in the West Bank and discharge into various areas of Israel.[79] The coastal aquifer and Gaza aquifer also provide significant sources of groundwater to Israel. Soil water is generally very low in the region due to lack of rainfall and is generally not accounted for, while re-used water is very difficult to track.[80] Manufactured water, freshwater created through desalination, while becoming more widespread, is still expensive and not used as a major water source.[81]

B. BACKGROUND AND CONFLICTS

Given the facts that several of the riparians of the Jordan River are extremely water scarce, water is distributed very unevenly in the region, and with several other geographic realities, it is no wonder there is so much thought devoted to wars over water in the Basin. In addition to the complicated and unevenly distributed water flows in the region, several general factors are seen to further exacerbate conflicts over water. These include an arid climate, ongoing political confrontations, and water demands approaching or surpassing supply, all of which are present in much of the Jordan River Basin.[82] Additionally, as Israel has established their position as a hydro-hegemon in the area, taking more than their supposed equitable share of water resources, on-going conflicts could be expected.[83]

Before the Second World War, lack of water was not a hindrance to economic activity in the region, and certain areas were even famous for their abundance of water supplies.[84] While water scarcity has always shaped the overall structure of populations in

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[79] Wolf, *Hydropolitics Along the Jordan*, 9–10.

[80] Allan, *Middle East Water Question*, 86–87.

[81] Ibid., 91.

[82] Aaron T. Wolf, "Middle East Water Conflicts," 2.

[83] Anders Jagerskog, "Water and Conflict in the Middle East," *Middle East Institute: Viewpoints*, June 2008, http://www.mei.edu/Portals/0/Publications/water-and-conflict-middle-east.pdf (accessed Feb 25, 2011), 2.

[84] Beaumont, "Conflict, Coexistence, and Cooperation," 21.

the area, the viewing of water as a foreign policy issue is relatively new.[85] When the early Zionists began coming to the Middle East en masse before the creation of the Jewish State, they saw the land as wasteland to be tamed.[86] As part of the national home to be created for the Jewish people, economic considerations for settling the area and taming the wasteland focused almost entirely on water.[87] It is of little surprise that, after the creation if Israel in 1948, all water in the nation was nationalized and placed under government administration. In order to protect their homeland, avoid control by outside forces, and create a functioning economy, Israelis needed to control their own supplies of water. Because the Arab-Israeli conflict is rooted in Arab rejection of the establishment of a Jewish state on Arab soil, it is a conflict that is demographic and territorial in nature.[88] The nature of the conflict and the scarcity of water in the region means that water is central to the root of the Arab-Israeli dispute.

With the idea that water is part of the root of the Arab-Israeli conflict that defines the Jordan River basin established, historical examples of conflicts in the region are examined that have had water as a causal factor. Most prevalent, and perhaps most cited of these examples is the 1967 war between Israel and the Arab States of the region. Some scholars affirm that the struggle over water was a major factor leading to the Six-Day War in 1967, and was central to the discussion of all aspects of the Arab-Israeli conflict.[89] In 1953, Israel began diversion projects on the Jordan River, which Syria quickly complained about to the United Nations. Following UN condemnation and a failed American effort to reach water-sharing agreements, Israel worked on projects to take water out of Lake Tiberius while Jordan started work to tame the Yarmouk River.[90]

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[85] Dolatyar and Gray, *Water Politics in the Middle East*, 94.

[86] Rosina Hassoun, "Water Between Arabs and Israelis: Researching Twice Promised Resources," in *Water, Culture, & Power: Local Struggles in a Global Context*, ed. John M. Donahue and Barbara Rose Johnston, 313–338 (Washington, D.C.: Island Press, 1998), 319.

[87] Wolf, "Middle East Water Conflicts," 4.

[88] Munther J. Haddadin, "Water in the Middle East Peace Process," *The Geographical Journal* (Blackwell Publishing) 168, no. 4 (Dec 2002): 324–340, 325.

[89] Moshe Shemesh, "Prelude to the Six-Day War: The Arab-Israeli Struggle over Water Resources," *Israel Studies* 9, no. 3 (Fall 2004): 1–45, 1.

[90] Charles D. Smith, *Palestine and the Arab-Israeli Conflict: A History with Documents*, 7th Edition (Boston, MA: Bedford/St. Martin's, 2000), 267–268.

While Israel worked on their National Water Carrier, Arab States worked on the Headwater Diversion Project. This construction all took place under the atmosphere of continued border disputes between Israel and Syria, believed by some observers to be deliberate Israeli actions to provoke retaliation and justify Israeli accusations of Arab hostility.[91] Several incidents followed in which actual attacks were carried out on water projects and tensions increased further. Eventually, the heightened tensions culminated in the Six-Day War. For those who see the 1967 war as a war over water, the water struggle was the key political, technical, and military factor that led to the Arab's escalation leading to the War.[92] Arab frustration over their defeats in the water struggle strengthened Arab resolve to overcome this loss through comprehensive action.[93] Meanwhile, the Israelis were driven by a need to secure access to ensure the availability of water, which was the motivating factor for their drives into the Golan Heights and West Bank.[94]

Israeli incursions into Lebanon, especially the 1982 invasion, also are sometimes looked at as an Israeli attempt to secure further access to precious water resources. As Israel's population continued to increase, agricultural demands were expanding, and the Jordan River basin was severely over utilized, so Israel needed new ways to expand its supply of water.[95] The high costs of supplying water through desalination, the increasing pollution of water supplies, and the failure of other unconventional methods of obtaining water meant that Israel looked toward Lebanon, the only neighbor with a water surplus, as a means of obtaining water.[96] Under the pretext of security concerns over Palestinian incursions into Israeli territory, Israel established several security zones in Lebanon, culminating in the 1982 invasion where Israeli forces moved all the way to Beirut. During the invasion, Israel prevented the use of the Wassani Springs and the Hasbani

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[91] Smith, *Palestine and the Arab-Israeli Conflict*, 268.

[92] Shemesh, "Prelude to the Six-Day War," 37.

[93] Ibid.

[94] Wolf, *Hydropolitics Along the Jordan*, 70.

[95] Dolatyar and Gray, *Water Politics in the Middle East*, 107.

[96] Ibid.

River.[97] Some commentators even claimed the main reason for the invasion was to seize control of the Litani River, located entirely within Lebanese territory.[98]

Another oft-cited example of conflict over water in the Jordan Basin is the 1987 Palestinian intifada. The conflict between the Palestinians and Israelis has largely revolved around the bond of people to territory, and water is one, if not the most, important material resource tying people to land.[99] With this idea in mind, in 1967, Israel nationalized all West Bank water, placing limits on water withdrawals from existing wells, extensively limited the creation of new wells, as well as closely metered, monitored, and controlled the amount of water that could be used.[100] The Israeli water plans were somewhat defensive in nature, due to the fact that about 30 percent of Israeli groundwater originates in the West Bank, but these restrictions resulted in the severe decline of several aspects of the occupied territories' economies.[101] In Gaza, Israelis were consuming seven times more water per capita than the Palestinians.[102] Israeli settlements were placed strategically to abut Arab communities and control their land and water resources.[103] Palestinians strongly objected to the tight controls over their water. As water demands by both the Palestinians and Israelis increased, so too did the tension of the scarce water resources in the region. Although water was not the actual spark that ignited the intifada, water scarcity in Palestine was one of the reasons the intifada started.[104]

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[97] Haddadin, "Water in the Middle East Peace Process," 326.

[98] Dolatyar and Gray, *Water Politics in the Middle East,* 107.

[99] Joe Stork, "Water and Israel's Occupation Strategy," *MERIP Reports: Israel's Strategy of Occupation* (Middle East Research and Information Project), Jul-Aug 1983: 19–24, 19.

[100] Wolf, *Hydropolitics Along the Jordan,* 60.

[101] Smith, *Palestine and the Arab-Israeli Conflict,* 403.

[102] Ibid.

[103] Ibid., 399.

[104] Hussein A. Amery, "Water Wars in the Middle East: A Looming Threat," *The Geographical Journal* (Blackwell Publishing) 168, no. 4 (Dec. 2002): 313–323, 314.

C. CONFLICTS RE-EXAMINED

While the historical examples shown above may appear to be clear-cut examples of water scarcity leading to either conflict, the reality of the situations is much more complex. The events explained here are shown in a vacuum where water concerns are the primary consideration. However, when viewed in a wider context, the situations change. It is nearly impossible to identify a sole cause of violent conflict between actors, and the question of what someone is willing to go to war over is difficult to answer with any degree of certainty.[105] However, it can be determined that these conflicts were not the wars over water that many have predicted.

While conflicts involving water projects certainly contributed to rising tensions before the 1967 War, they not the sole cause of war, and were not even a primary contributor. While hostilities over the Syrian diversion project did lead to violent confrontation, the conflict ended in 1966 when Syrian construction stopped, a full year before the war erupted. Israel's objectives on their initial attacks were to defeat the Egyptians, avoid withdrawal before a real peace was concluded, resist implementation of the previous armistice, and maintain close ties to the United States.[106] Syria's increasing militarism, Nasser's recklessness in his attempts to lead the Arabs, Israeli fear of elimination, and American involvement in the region were also all contributing factors to the war, and were most likely larger contributors to the war than water.[107] Even if water had played a role in the decision to gain control over certain territories during the war, the Israeli government was still largely willing to trade their conquered lands in return for a peace treaty.[108]

The cases of the invasion of Lebanon and the intifada are not much different from the 1967 War in terms of confusion over the motivation water gains provide. While focusing solely on water, it can be seen how their concerns could lead to conflict but, in

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[105] Beaumont, "Conflict, Coexistence, and Cooperation," 26.

[106] David Schoenbaum, *The United States and the State of Israel* (New York, NY: Oxford University Press, 1993), 154.

[107] Smith, *Palestine and the Arab-Israeli Conflict*, 288–289.

[108] Schoenbaum, *United States and Israel*, 160.

the wider context, water played little role in the disputes. Border attacks by Palestinians in Lebanon lead to the Israeli invasions of Lebanon. While Israel did block access to the Wazzani and Hasbani, if the motivation of the invasions were in fact water, Israel would not have withdrawn under the armed resistance of Lebanese militias. Additionally, while some saw control of the Litani as a goal for Israel's occupation, the Lebanese government themselves dismissed claims that Israel had, in fact, been diverting or using the waters of the Litani River.[109] For the Palestinians, the intifada certainly had water as a grievance contributing to poor living conditions and a weak economy. However, the ultimate causes of the revolt were poverty, refugee camps, hatred of occupation, and primarily, Palestinian humiliation from the previous 20 years.[110] While water may have been a factor in these conflicts, neither of these clashes were wars over water.

D. COOPERATION

Turning from water resources as a source of conflict, the paper now looks at historical examples where water resources have served as a means of cooperation. Attempts at the creation of Basin wide water management plans have been tried many times during the Arab-Israeli conflict, including efforts before Israel was even a state. These plans and studies had widely varying outlooks including the Ionides Plan, a 1939 British study that noted that water concerns would limit further immigration to Palestine while the 1944 French Lodermilk Plan said that proper water management would allow for millions more refugees to be taken into the region.[111] Perhaps most famous of these early water sharing ideas was the Johnston Plan of 1955. While Johnston was able to obtain agreements from both Arab and Israelis on the practical aspects of a water sharing agreement, the plan still collapsed not due to the technical aspects of the water agreements but the political animosity between parties at the time.[112] For the most part, these potential agreements and means of cooperation failed because they were attempts

[109] Haddadin, "Water in the Middle East Peace Process," 326.

[110] Avi Shlaim, *The Iron Wall: Israel and the Arab World* (New York, NY: W. W. Norton and Company, Inc., 2001), 451.

[111] Wolf, "Middle East Water Conflicts," 5. For more on other plans see Wolf, *Hydropolitics Along the Jordan,* 42–59.

[112] Taubenblatt, "Jordan River Basin," 46.

by outsiders to achieve peace that were not necessarily connected to the desires of the participants. However, more recent developments, such as integrated and more comprehensive hydrological studies as well as political changes in the context of the Arab-Israeli conflict, have allowed further cooperation in the region.

The first of these examples is the peace treaty concluded between Israel and Jordan in 1994. When these peace talks opened in 1991, the region was suffering a heavy drought and water became a motivating factor for the talks themselves, with one observer even noting that Jordan was being pushed into peace because of water.[113] In this instance, the joint will to reach a peace agreement and the water needs on both sides of the negotiating table facilitated an amicable solution.[114] This peace treaty ended the legal state of war that had existed between the two nations for more than 40 years and, while water agreements were not the only goal of the treaty, they were a major contributor, and constituted one of the five regional subjects of the negotiation process. The treaty spelled out allocations for several water sources shared between the two nations and recognized that water resources are not sufficient to meet their needs, so cooperative projects are needed to alleviate water shortages. As time has passed, some relations outlined in the treaty have not been particularly smooth, but the water relations between Israel and Jordan have been maintained, validating the notion that water is a source of cooperation.[115]

The peace talks between Israel and the Palestinians from 1993 to 1998 are another example where water has potentially served as a means of cooperation instead of conflict. While final agreements on water rights were postponed until the Final Status arrangements, there has still been much progress toward cooperation fueled by water. Leading up to the 1993 agreement, the Israeli/Palestine Center for Research and Information held simulated negotiations over water and cosponsored an international conference on water, while other organizations performed similar roles.[116] The 1993

[113] Wolf, *Hydropolitics Along the Jordan*, 67.

[114] Haddadin, "Water in the Middle East Peace Process," 337.

[115] Ibid.

[116] Wolf, *Hydropolitics Along the Jordan*, 69.

Declaration of Principles and Interim Self-government Agreement created a Palestinian Water Administration Authority, and focused on cooperation in the field of water.[117] The 1995 Interim Agreement on the West Bank and the Gaza strip took the large step of Israeli recognition of water rights, as well as the creation of a Joint Water Committee established to manage and protect water for the interests of both parties.[118] As more territory has been transferred to Palestinian control, especially under the 1998 agreement reached at Wye Plantation, the correlation between territory and the location of water resources has been more apparent, with defensive hydro-strategic considerations falling by the wayside while joint management of resources and creative solutions to problems become more prominent.[119]

E. CONCLUSIONS

While the nations that border the Jordan River all use its waters, it is not the only source of this precious resources throughout the Basin. Lebanon's internal rivers and relativly high rate of precipitation, Syria's location on the Euphrates, and the groundwaters of Israel and Palestine provide other sources of water, but the Jordan ties them all together. As these countries, and Jordan, have shared interest in the Jordan River Basin, they are all linked together. While the Arab-Israeli conflict has largely dominated the region for more than 50 years, the scarce water in the region has not been the source of fighting between these countries, and has in fact been a source of cooperation.

Although there have been no true water wars between the states that share the Jordan, it cannot be said that there have not been severe confrontations over its use. However, these confrontations only further illuminate why wars over water are not practical. Mounting tensions leading to the war in 1967 saw the relatively rare

[117] Israel Ministry of Foreign Affairs, *Declaration of Principles: 13 Sep 1993*, http://www.mfa.gov.il/MFA/Peace+Process/Guide+to+the+Peace+Process/Declaration+of+Principles.htm (accessed Sep 10, 2010), Art. VII + Annex III.

[118] Israel Ministry of Foreign Affairs, *The Israeli-Palestine Interim Agreeent - Main Points: 28 Sep 1995*, http://www.mfa.gov.il/MFA/Peace+Process/Guide+to+the+Peace+Process/The+Israeli-Palestinian+Interim+Agreement+-+Main+P.htm (accessed Sep 10, 2010).

[119] Wolf, "Trends in Transboundary Water Resources," 150.

phenomenon of actual violence over water resources. Both the Arabs and the Israelis attempted to construct large-scale projects that would help supply their own water needs, but deny water to other nations. Clearly, water was viewed as a strategic resource. However, these large-scale projects were attacked by both sides. Water became a target of both large- and small-scale military actions, which not only showed the vulnerability of water projects to attack, but also that these contentious water policies were not economically worthwhile. As an additional example, even though it is shown that Israel's invasion of Lebanon was not water based, had it been, the invasion and the attacks it provoked would have been far more costly, both in terms of money and lives, than any water that potentially could have been pilfered.

Cooperation, on the other hand, benefits all those who attempt to share in the resources of the region. Cooperation has occurred along the Jordan as water has become seen less as a strategic resource that needs to be controlled, and more as a finite part of the environmental that needs to be shared. In fact, times of even greater scarcity can lead to greater cooperation, as the drought leading up to the 1994 treaty between Jordan and Israel has shown. Additionally, while attempts by outsiders to implement plans of shared management and joint responsibility have largely failed in the past, more recent events that have more heavily involved those nations with stakes in the matter, or actually been undertaken by the nations involved, have been vastly more successful. Cooperation over water can help build relationships and trust between the countries even when other realms of the political environment are not particularly friendly. A current example is the Executive Action Team made up of Israelis, Palestinians, and Jordanians who have met uninterrupted since 1992 as part of the Joint Water Committee created in the Interim Agreement, and has contributed to trust building between the parties while focusing on water issues.[120]

There have been no wars over water in the Jordan River Basin. Instead, cooperation has largely been the dominant way to deal with the scarce resources in the

[120] Anders Jagerskog, *Why States Co-operate over Shared Water: The Water Negotiations in the Jordan River Basin*, Vol. 2: Hexagon Series on Human and Environmental Security and Peace, in *Water Resources in the Middle East: Israel–Palestinian Water Issues–From Conflict to Cooperation*, ed. Hillel Shuval and Hassan Dweik, 195–202 (New York, NY: Springer, 2007), 196.

region. While there have been several supposed examples of water wars in the region, on closer inspection water was not the reason for the conflict. Cooperation, however, has been widespread through the region, and has increased significantly in more recent times. This is, unfortunately, not to say that there have not been outbreaks of violence associated with claiming water resources. However, in the case of interstate violence, they episodes were short lived, without further escalation, and infrequent. More internal forms of water related conflict, such as that between the Iraelis and occupied Palestinian territory, have occurred, but these will be discussed later in the paper in the dicussions of domestic water mangement.

IV. THE TIGRIS-EUPHRATES RIVER BASIN

> *If there is a political will for peace water will not be a hindrance. If you want reasons to fight, water will give you ample opportunities.*
>
> —Uri Shamir[121]

Despite the vast difference between the Tigris-Euphrates and Jordan River Basins, they do share some similarities. Like the Jordan, the nations that share the Tigris-Euphrates Basin have existed in a state of escalated water tensions for the last 50 years and, like the Jordan, many see the Tigris and Euphrates Rivers as a potential flash point for future wars over water. In fact, some American agencies have ranked the Tigris-Euphrates Basin as the second most likely source of water wars behind only the Jordan.[122] However, as this chapter shows, like the Jordan Basin, the pessimistic view of conflict in the Tigris-Euphrates region is misplaced. While there have been increased tensions and even near conflicts over the supposed use of these rivers, attempts to utilize the rivers' resources have not led to violent confrontations. Instead, cooperation has been the more likely resort. Where tensions did flare, they were largely the result of other, non-water related issues between the countries involved.

A. HYDROLOGY

While the Tigris and Euphrates Rivers are separate entities, they are examined together here because of the close proximity of their origin, they both flow through the same countries, and they are joined, both naturally and through development projects, before flowing into the Persian Gulf. The Euphrates River is the longest river in Southwestern Asia and begins in the mountains of eastern Turkey from the Kara Su and Murat tributaries. From there, the Euphrates follows a torturous path through Syria, where it is joined by three other tributaries, most significantly the Khabur, and then flows through Iraq. No water is added to the river in Iraq until it merges with the Tigris.[123]

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121 As quoted in Lonergan, 124.

122 Dolatyar and Gray, *Water Politics in the Middle East*, 116.

123 Soffer, *Rivers of Fire*, 75.

Overall, the Euphrates receives 90 percent of its flow from Turkey, with the remaining 10 percent coming from Syria.[124] The Tigris River, the second largest in Southwest Asia, also begins in the mountains of eastern Turkey, but follows a much more direct path to its conclusion. From Turkey, the Tigris briefly forms the Turkish-Syrian border before flowing into Iraq, where its four main tributaries join the river, the sources of which begin in both Turkey and Iran.[125] The Tigris receives 53 percent of its flow from Turkey and the remaining portion comes from Iran and Iraq.[126] The Tigris and Euphrates meet to form the Shatt al-Arab, which flows south approximately 100 miles before it empties into the Persian Gulf. Although some of the Tigris's tributaries rise in Iran, and the lower Shatt al-Arab forms the border between Iraq and Iran, this paper does not include Iran in the analysis of water conflicts and cooperation in the region due to the fact that Iran's tensions with the Tigris and Euphrates riparians largely is not over the use of water resources.

As the largest two rivers in the region, covering an area almost twenty times larger than the Jordan River Basin, there are great disparities between the conditions and the use of their waters in the countries they flow through. Additionally, a disparity concerning actual water data exists. There are several possible reasons for this, including possible environmental factors due to the great seasonal fluctuations and wide annual variations in precipitation and river flows. Seasonally, the Tigris has its greatest discharge from March through May, accounting for 53 percent of the annual flow while the Euphrates' high flow is in April and May, making up 42 percent of its yearly discharge.[127] Accounting errors or unfamiliarity with regional situations can also lead to data inconsistencies. Additionally, there could be a strategic component to these disparities where knowledge could be seen as power and the states involved spread

[124] Neda A. Zawahri, "Stabilizing Iraq's Water Supply: What the Euphrates and Tigris Rivers Can Learn from the Indus," *Third World Quarterly* 27, no. 6 (2006): 1041–1058, 1044.

[125] Klare, *Resource Wars*, 173.

[126] Zawahri, "Stabilizing Iraq's Water Supply," 1044.

[127] Murakami, *Managing Water for Peace*, 39.

whatever information will most serve their own causes.[128] Where wide differences in data appear, this paper attempts to use the numbers that provide the more conservative estimates or come from the more recent data.

While none of the states that share the Tigris and Euphrates are "water rich" by world standards, they do fare considerably better than most other countries in the region. Measured in terms of cubic meters per year per capita, approximate water availability in Iraq, Turkey, and Syria are 2,000, 1,800, and 1400, respectively.[129] All three countries rely on the waters of these rivers for irrigation, hydro-electricity, and regional development plans, but to varying degrees. The importance of the rivers varies widely with the Tigris and Euphrates making up 28.5 percent of Turkey's total water surface flow, and the extreme estimates saying the Euphrates alone accountants for up to 86 percent of Syria's total available water while both rivers provide 98 percent of Iraq's total supply.[130] [131] [132] However, more conservative estimates put both Syria and Iraq's dependency ratio, the percentage of total renewable water resources originating outside the country, at between 50 and 75 percent.[133] All three countries make extensive use of the rivers and have plans for even more heavy use in the future that go far above the available supply. Together, Turkey, Syria, and Iraq's future consumption targets for the Euphrates Basin total almost one and a half times its potential, while the target for the Tigris is 112 percent its potential.[134] With these numbers in mind, there appears to be clear potential for future conflict over these waters, which is exactly what the pessimists argue when discussing recent and future events.

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[128] Dolatyar and Gray, *Water Politics in the Middle East,* 141–142.

[129] Ali Carkoglu and Mine Eder, "Domestic Concerns and the Water Conflict over the Euphrates-Tigris River Basin," *Middle Eastern Studies* 37, no. 1 (Jan 2001): 41–71, 52.

[130] Mehmet Tomanbay, "Turkey's Water Potential and the Southeast Anatolia Project," in *Water Balances in the Eastern Mediterranean*, ed. David B. Brooks and Ozay Mehmet, 95–112 (Ottowa, ON: International Development Research Centre, 2000), 100.

[131] Carkoglu and Eder, *Water Politics in the Middle East,* 52.

[132] Zawahri, "Stabilizing Iraq's Water Supply," 1041.

[133] United Nations Development Programme, *Human Development Report 2006: Beyond Scarcity: Power, Poverty, and the Global Water Crisis* (New York, NY: Palgrave Macmillan, 2006), 210.

[134] Carkoglu and Eder, *Water Politics in the Middle East,* 57.

B. BACKGROUND AND CONFLICTS

As would be expected in this region that has hosted great civilizations since the beginning of history, there is a long record of water use in the basins of the Tigris and Euphrates Rivers. In the arid environment, even the earliest civilizations relied heavily on a well-developed and maintained control over water. While these early peoples relied heavily on the Tigris and Euphrates, their consumption did not even come close to the full capacity of the rivers. Even into modern times, nations were essentially free to make use of the water resources as they saw fit. However, the free use of both rivers has created issues that strongly affect the region today. While the vast majority of the sources of the basins arise in Turkey, Iraq, the most downstream nation, has historically made the most use of the waters while contributing the least to their flows.

It was not until the second half of the 20th century that Iraq has had to compete with the ever-increasing water demands of both Syria and Turkey.[135] Despite the fact that both Syria and Iraq have a historical claim to rights to use the rivers, Turkey takes a different view. While both Syria and Iraq see the rivers as international waterways that should be treated as an integrated entity by all riparians, Turkey sees them as transboundary rivers.[136] In this light, the rivers fall under the exclusive sovereignty of Turkey until they flow across the borders.[137] The Turks have expressed the view that they have the right to do anything they like with the waters, and the flows that reach their riparian neighbors are a gift from Turkey. They believe Syria and Iraq can claim no more right to Turkey's waters than Turkey can to Iraqi oil.[138] The simple fact that Syria is downstream of Turkey, and Iraq is downstream of them both, means that all nations were forced to undertake unilateral efforts at ensuring they had sufficient access to water, a situation that could easily lead to conflict.

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[135] Eyal Benvenisti, "Water Conflicts During the Occupation of Iraq," *The American Journal of International Law* 97, no. 4 (Oct 2003): 860–872, 865.

[136] Ali Akanda, Sarah Freeman and Maria Placht, "al Nakhlah," *The Tigris-Euphrates River Basin: Mediating a Path Towards Regional Water Stability*, The Fletcher School, Spring 2007, http://fletcher.tufts.edu/al_nakhlah/archives/spring2007/placht-2.pdf (accessed Mar 7, 2011), 2.

[137] Ibid.

[138] Zawahri, "Stabilizing Iraq's Water Supply," 1046.

As each state unilaterally worked to develop the rivers within its territory, little care was taken for the impact it might have on downstream riparians.[139] This condition obviously had the greatest effect on Iraq, which came to a head when, in 1974 and 1975, both Turkey and Syria were filling the reservoir behind the Keban and Tabqa dams, and since this happened during a dry time of the year, the flow of the Euphrates to Iraq essentially stopped.[140] Understandably disturbed by this development, Iraq called a meeting of the Arab League to help alleviate the situation. However, the Arab League was unable to negotiate a settlement and, as a result, Iraq threatened to bomb the Tabqa dam in Syria.[141] Syria and Iraq both massed forces on their borders and Saudi mediation was needed to secure an agreement in which Syria released water from the dam to Iraq. A less serious, but similar, incident occurred in 1983, when Syria blamed Turkey for the drop in the water level in the Tabqa Dam.

While the incidents of 1975 and 1983 were resolved relatively quickly, Turkey's commitment to a much larger project would have much more far-reaching effects. In 1977, Turkey announced plans for the largest water development project in the history of the region. The Southeast Anatolia Development Project (GAP) consists of 22 dams and 19 hydroelectric projects for irrigation, power, and socio-economic development.[142] The GAP is huge in scale with projects on both the Tigris and Euphrates covering nine Turkish provinces and an area greater than 75,000 square kilometers. Not only is the project intended to provide additional energy and water for agriculture, but because the region being developed lags behind the rest of Turkey in most social indicators, it is hoped that GAP will contribute significantly to the development of the region as a whole.[143] Because this region is home to the majority of the Kurds, it is also hoped this project can help remove the so-called "Kurdish Problem" from Turkey. However, while

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[139] Zawahri, "Stabilizing Iraq's Water Supply," 1048.

[140] Soffer, *Rivers of Fire*, 111.

[141] Zawahri, "Stabilizing Iraq's Water Supply," 1049.

[142] Ali Akanda, Sarah Freeman, and Maria Placht. "al Nakhlah." *The Tigris-Euphrates River Basin: Mediating a Path Towards Regional Water Stability.* The Fletcher School. Spring 2007. http://fletcher.tufts.edu/al_nakhlah/archives/spring2007/placht-2.pdf (accessed Mar 7, 2011), 2.

[143] Carkoglu and Eder, *Water Politics in the Middle East*, 44–48.

the GAP has provided strong political momentum and pride in Turkey, as well as great hopes for the future, it has also led to increasing tensions among the riparians of the Tigris and Euphrates.

Despite Turkey's grand plans for development of both the Tigris and Euphrates Rivers, there was little opposition from either Syria or Iraq until the 1980s, when efforts changed from a focus on hydroelectricity to more development- and agricultural-based plans.[144] While hydroelectric developments did little to stem the water flow to both Syria and Iraq, and indeed even provided significant benefits by regulating the highly seasonal river flows, agricultural use of the waters would mean a significant smaller portion of water being passed to those downstream. Syria and Iraq, fearful of a reduced water supply, objected to the World Bank that the projects would cause them harm, and were successful in their bid to block World Bank funding of GAP related developments. These financial tactics caused significant delays in large projects, as well as contributing to many of Turkey's economic problems.[145] However, Turkey was able to obtain its own financing for the GAP and, although progress was slowed, it was not stopped.

Financial tools have not been the only weapons used against Turkey in the conflicts caused by tensions of scarce water resources in the area. Syria felt it needed to force Turkey's hand on the water issue and, although Syria was militarily and economically unable to force a showdown with Turkey, they realized the security and stability of Turkey was vulnerable to Kurdish action.[146] Syria lent its support to the Kurdistan Worker's Party (PKK), an armed group that actively fights against Turkey for the creation of an independent Kurdish state. In 1983, Turkey publically announced their anger over Syrian support of the PKK and, in 1986, the Syrians publically linked water and security, saying they would only agree to security protocols if Turkey entered into a formal water agreement.[147] In 1987, Turkey agreed to maintain an average flow of the Euphrates at the Syrian border of 500 m^3/s in return for Syria's pledge to end its support

[144] Carkoglu and Eder, *Water Politics in the Middle East,* 59.

[145] Dolatyar and Gray, *Water Politics in the Middle East,* 154.

[146] Ibid.

[147] Ibid., 155.

of PKK. Syria continued its support PKK activities, however, which came to a head in 1998. In October, with the background of water and the support of anti-Turkish groups, Turkey threatened military action against Syria unless it ended its support of PKK activities.[148] While Syria acquiesced to Turkey's demands and an agreement was signed, it largely did not solve the ongoing disagreements between the two nations.

C. FRAMEWORK FOR RE-EVALUATION

With the context established above, and the near conflicts that unilateral water development have seemed to cause in the region, water pessimists argue that hydro politics in the Tigris and Euphrates Basins have been a recipe for conflict. However, the situations detailed above, and the arguments of the pessimists, focus entirely on water. Examined through a broader context the idea of water being the major contributor to regional tensions is flawed. The four-part framework established by Dolatyar and Gray provides the basis for analysis in showing why the pessimistic view is wrong. The facts of the analysis are that water shortages are not actually present in any of the riparians, water problems within countries are largely a result of allocation within each state itself, water does not hold the level of strategic importance that the situations detailed ascribe to it, and that there have been ongoing efforts to share water between the riparians.[149] These efforts at cooperation are described in the next section, but evidence for the rest of the framework is outlined below.

Unlike the countries that share the Jordan River Basin, those that share the Tigris and Euphrates do not face an imminent shortage of water. While it was previously established that none of the countries could be called water rich, none of them are water poor either. Turkey has a renewable annual freshwater capacity of 234 km^3 annually, of which it withdraws just 17 percent each year.[150] Syria and Iraq are not nearly as well endowed with water as Turkey, but still have adequate resources. Of their available water, Syria withdraws 76 percent of their available supply while Iraq withdraws just 56

[148] Carkoglu and Eder, *Water Politics in the Middle East,* 61.

[149] Dolatyar and Gray, *Water Politics in the Middle East,* 117.

[150] Peter H. Gleick, et al., *The World's Water 2006–2007: The Biennial Report on Freshwater Resources* (Washington, DC: Island Press, 2006), 225.

percent.[151] Syria even goes so far as to have net exports of the equivalent of more than 4 billion m^3 per year in virtual water, the amount of water necessary for producing the food they export.[152] Claims of water shortages often resolve around projected needs, but these often do not materialize. As one example, whereas Syria planned to irrigate over 600,000 acres of land from the Tabqa damn, the quality and salinity of the land have allowed irrigation of only approximately one-third of this area.[153] Clearly the region is not in, or facing, a time of water need or scarcity.

Because none of these countries are actually facing a water shortage, problems they have in terms of water availability are due to problems of allocation within the state, and not of distribution between states. This can be easily seen by the fact that despite having enough water in both Syria and Iraq just over 80 percent of the population has access to safe drinking water.[154] It can also be seen through the distribution of water use. In Syria, 3 percent of total water is used by the domestic sector, 2 percent by industry, while a staggering 95 percent is used for agriculture.[155] Similarly, Iraq's domestic sector uses 3 percent, industry 5 percent, while agriculture accounts for 92 percent of use.[156] This large devotion of resources is partly due to the fact that, historically, the small farms that make use of the waters in both countries have been sources of unrest for the established regime so they are plied with water in an attempt to gain loyalty.[157] In addition to allocating water to earn devotion, the threat of water scarcity can also serve to mobilize support for the government against the supposed foreign enemies that are causing internal problems so the efficient allocation of water may not even be a priority.[158]

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[151] Gleick et al., *The World's Water*, 145.

[152] The World Bank, "Making the Most of Scarcity," 144.

[153] Carkoglu and Eder, *Water Politics in the Middle East,* 57.

[154] Gleick et al., *The World's Water*, 244.

[155] Ibid., 232–234.

[156] Ibid.

[157] Carkoglu and Eder, *Water Politics in the Middle East,* 57.

[158] Ibid., 65.

In order to see the tensions and conflicts of the Basin in terms of conflict over water one has to ignore the larger security situation surrounding the problems. When these situations are examined in a wider context it is clear that water does not hold the strategic importance needed for these conflicts to be about competition for water. Syria and Iraq have complained that the GAP is a means of building Turkish dominance over them and the Arab media has even portrayed the filling of the Ataturk dam as a belligerent act.[159] However, Turkey has continued to see the GAP as a project for important regional development and even notes that the regulation of flow many of their projects provide are beneficial to both Syria and Iraq. While Syria was supporting the PKK against Turkey, Iraq did not get involved because other issues had much greater strategic importance than water. Iraq was fighting the Iran-Iraq war at the time and after Syria closed its border with Iraq, Turkey provided the only available outlet for distributing its oil.[160] It was only after Turkey and Iraq's relations soured that Syria and Iraq could again join together on the water issue to oppose Turkey, so clearly water was not the top priority that some pessimists give it. Regional rivalries between the three nations have also manifested themselves in other ways—such as when Turkey and Syria sided with the allied forces against Iraq in the Persian Gulf War of the 1990s, the Turkish-Syrian territorial dispute over Alexandretta, Syrian and Iraqi competition over Ba'athist leadership, attempts at regional leadership, and other tension filled relations—but none of these are over water. While tensions and conflicts certainly exist among the three nations, they are not mainly due to water.

D. EFFORTS AT COOPERATION

There is no comprehensive agreement between Turkey, Syria, and Iraq to share the waters of the Tigris and Euphrates Rivers. However, there is a long history of water agreements in the region. The 1923 Treaty of Lausanne included provisions providing that Iraq must be consulted before Turkey embarked on any hydraulic projects. The 1946 Treaty of Friendship and Neighborly Relations between Turkey and Iraq again required

[159] Carkoglu and Eder, *Water Politics in the Middle East,* 57 and Akanda, Freeman and Placht, "al Nakhlah," 3.

[160] Carkoglu and Eder, *Water Politics in the Middle East,* 59.

Turkey to consult Iraq of planned infrastructure along the Tigris or Euphrates and allowed Iraqi construction of meteorological and geographic surveys inside Turkey. In 1987, Turkey and Syria concluded a protocol on technical and economic cooperation that promised to average a 500 m^3 per second yearly flow of the Euphrates from Turkey to Syria in return for Syria's cooperation on border security. Although this was regarded as a temporary agreement, the 500m^3 per second promise was confirmed twice more in ministerial meetings between the two countries in 1992 and 1993.[161] While there have still been some Syrian complaints, Turkey has largely met and often significantly exceeded its promised flow.[162] Syria and Iraq signed an agreement that no matter what the flow of the Euphrates from Turkey, Syria would keep 42 percent and give 58 percent to Iraq. Despite tense relations between the two, Syria has maintained the rates agreed upon.

In addition to the agreements between the nations of the Tigris and Euphrates, the three countries have also been actively engaged in technical consultations mostly through various groups known as the Joint Technical Committee (JTC). In 1962, Syria and Iraq formed a Joint Technical Committee, but it had a somewhat limited role as there were no major projects during the time the committee stayed together.[163] In 1972 and 1973, a JTC met several times to discuss how to fill the Tabqa and Keban dams without affecting downstream irrigation. While no agreement was reached as a result of these meetings, they did facilitate a series of trips to various sights within the countries involved and aided information sharing.[164] In 1980, Iraq and Turkey created a new JTC that was joined by Syria in 1983. This committee met a total of sixteen times before disbanding in 1993. This JTC again did not fulfill its goal of formulating a proposal for the sharing of waters to create a trilateral regime for efficient water utilization, mostly due to problems of definition of transboundary and international waterways. However, while they did not

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[161] Natasha Beschorner, *Water and Instability in the Middle East*, Adelphi Papers, 273 (London: International Institute for Strategic Studies, 1992), 40 and Zawahri 1047.

[162] Zawahri, "Stabilizing Iraq's Water Supply," 1048.

[163] Beschorner, *Water and Instability*, 39.

[164] Aysegul Kibaroglu, *Building a regime for the waters of the Euphrates-Tigris River Basin* (New York, NY: Kluwer Law International, 2002), 225.

achieve their goal, the importance of these meetings should not be understated because of the great information exchange it allowed as well as providing an important channel for communication.[165] In 2008, the three countries again agreed to restart JTC meetings, which has resulted in the memorandum to strengthen communication, development of joint flow monitoring stations, and an exchange between Turkey and Iraq to trade oil for help curbing terrorist activity.[166]

Current conditions in the region look favorably to continued cooperation in the future and perhaps even progress toward a comprehensive water-sharing agreement. A new plan to share water effectively would mean that Syria and Iraq could drop their complaints about the GAP to the World Bank, which could greatly improve Turkey's ability to gain outside financing, both from the World Bank and other large organizations, to complete their plans.[167] Syria has lost any leverage it previously held over Turkey by giving up their support of Kurdish rebels working inside Turkey. Since, as one Syrian official noted, their plan now is simply be nice to Turkey and hope for the best, they are ready to negotiate an agreement.[168] In Iraq, a major portion of the legitimacy the new and relatively weak government will derive will come from providing the basic public goods, water and electricity, that an effective water sharing agreement will help bring.[169]

E. CONCLUSIONS

A pessimistic viewpoint argues that Syria, Turkey, and Iraq only negotiate "when water levels have been so low as to seriously threaten their national security."[170] While this view is flawed both on the concepts of security and the actual water availability of the region, it does bring about a positive point for optimism in the region. Even when the

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[165] Kibaroglu, *Euphrates-Tigris River Basin*, 227.

[166] Geopolicity, "Managing the Tigris-Euphrates Watershed: The Challenge Facing Iraq," Aug 2010, http://www.geopolicity.com/upload/content/pub_1287582157_regular.pdf (accessed Mar 09, 2011), 16.

[167] Zawahri, "Stabilizing Iraq's Water Supply," 1051.

[168] Ibid.

[169] Ibid.

[170] Akanda, Freeman and Placht, "al Nakhlah," 5.

nations may have felt threatened, they still turn to negotiation and cooperation. Since there have never been any wars fought over water between these countries, they are clearly choosing cooperation over conflict.

By and large, the countries have chosen cooperation over conflict over the Tigris and Euphrates Rivers. Unlike the Jordan, this region has not seen any violence over the shared use of the rivers. While there have been heightened tensions, these confrontations have largely not been about water. While pessimists point to the region as another area of conflict and potential water wars, their analysis is flawed because they give water a strategic importance it does not merit: there is not a water shortage, problems of lack of water are due to domestic allocation and not interstate distribution, and there have been many attempts at cooperation. While there have been no comprehensive management plans involving all three nations, there have been many other agreements reached. Many of the attempts to work through committees have not been as successful as hoped, but progress continues on that front. Additionally, the political situations in the region are now, more than ever before, favorable for cooperation to continue and improve in the future.

V. WATER MANAGEMENT IN THE ARABIAN PENINSULA

> *These societies, being based on a temporary resource, face the problem of being temporary themselves.*
>
> —Charles Bowden[171]

Up to this point, this paper has largely focused on disputing the idea that water scarcity among those who share international waterways leads to conflict and instead showing how it leads to cooperation. Now, however, it takes a different path in investigating the water situation facing the countries of the Arabian Peninsula. These countries do not share surface waterways and instead focus primarily on groundwater and desalination for their water needs. Heavy dependence on nonrenewable groundwater and massive investment in the production and transportation of freshwater sources have created the illusion of plenty even in the very arid conditions of the region. These conditions are not sustainable and cracks in the fantasy of abundance have already formed. Unfortunately, while water has largely not been a major contributor to unrest to this point, future shortages could make water the most politically divisive issue in the region

A. HYDROLOGY

Unlike the areas previously discussed, the Arabian Peninsula is bereft of rivers, lakes, or streams. It is mainly a severe desert environment containing some of the largest and hottest sand dune deserts in the world, where only highly adapted desert plants grow without groundwater brought up from aquifers.[172] Rainfall in the region is scant and irregular with averages ranging from 70 to 130 mm per year. However, the averages mean little since many locales can receive no rain at all for months or even years at a time. Flash flooding can occur in certain areas during periods of high intensity and short duration rains. These floodwaters generate the only surface runoff in the region and are

[171] Speaking of fossil groundwater depeltion in Charles Bowden, *From Killing the Hidden Waters*, University of Texas Press, Austin, http://www.ruf.rice.edu/~cses/csessite/restricted/EreadDocs/killing_waters.pdf (accessed Mar 15, 2011), 5.

[172] Dolatyar and Gray, *Water Politics in the Middle East*, 167.

used for flood irrigation, stored behind dams, and recharge the shallow aquifers that dot the area.[173] There are more than 200 dams in the region that function for both flood protection and groundwater recharge.[174] Runoffs are much more pronounced in the mountain ridges of the west, southwest, and southeastern portions of the peninsula, while the remainder of the region has very little relief and poorly defined drainage patterns.

In addition to the very small amount of rain, the Arabian Peninsula has alluvial aquifers, those aquifers that are generally shallow and renewable, throughout the region. This groundwater is the only renewable water source for several of the countries in the peninsula.[175] Saudi Arabia contains the largest water reserves in alluvial aquifers, accounting for almost 65 percent of the total capacity in the region.[176] These water sources have been used by the region's inhabitants for centuries and have been an important tool for survival in the inhospitable climate of the region. Today they are used largely for domestic and irrigation purposes; however, more recent developments mean these resources are being used faster than they are being recharged, and as such provide less usable water than they once did.

There are also large amounts of water stored deep under the region in a series of deep aquifers that hold water from hundreds or thousands of years ago. While there is some debate over whether some of these aquifers are recharged at all, it is generally regarded that these sources are either not recharged or recharged at such a slow rate that they are viewed as nonrenewable.[177] These aquifers store enormous quantities of water and are the only dependable source of water for Saudi Arabia and some of the other states in the peninsula.[178] Despite their size, the fact that these aquifers are essentially nonrenewable means they will only provide limited quantities of water. Additionally, the

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[173] Jamil Al Alawi and Mohammed Abdulrazzak, "Water in the Arabian Peninsula: Problems and Perspectives," in *Water in the Arab World: Perspectives and Prognoses*, ed. Peter Rogers and Peter Lydon, 171-202 (Cambridge, MA: Division of Applied Sciences, Harvard Universtiy, 1994), 175.

[174] Ibid., 178.

[175] Ibid.

[176] Dolatyar and Gray, *Water Politics in the Middle East,* 168.

[177] Murakami, *Managing Water for Peace,* 94–95.

[178] Alawi and Abdulrazzak, "Problems and Perspectives," 180.

water quality found in these aquifers varies widely from place to place, and increased depletion of these water reserves often means the quality degrades as levels become progressively lower. Also, due to their size, these large aquifers often cross international boundaries. However, problems of competition and cooperation between the nations of the Arabian Peninsula will not be discussed here and instead the focus will remain on domestic use and its effects.

In addition to the naturally occurring sources of water available to the countries of the Arabian Peninsula, many of the states in the region have undertaken substantial efforts at providing additional freshwater through desalination. Desalination involves taking either salt or brackish water and generally either heating it or pushing it through special membranes in order to remove impurities, such as salt, to create additional freshwater. Kuwait was the first country in the region to adopt seawater desalination, beginning in 1957. Saudi Arabia did not commission its first desalination plant until 1970, but has since become the world leader. Because it is a relatively expensive way to produce freshwater, only those states with sufficient wealth and a severe lack of water turn to desalination as a viable option. Many of the oil rich countries in the region fit this description well, and it is little surprise that the countries of the Gulf Cooperation Council (GCC) account for 57 percent of global desalination capacity, with Saudi Arabia leading the world in this regard.[179]

B. WATER AVAILABILITY AND USE IN THE ARABIAN PENINSULA

Examination of the availability of water in the region reveals startling information about the degree of water scarcity in the region. While earlier examples cited in this paper made reference to countries that are categorized as facing water scarcity, when referring to nations in the peninsula it is more of an issue of absolute scarcity. This is when the annual per capita water supplies are less than $500m^3$.[180] In regard to renewable

[179] Michael Dziuban, "Scarcity and Strategy in the GCC," *Center for Stategic & International Studies*, Middle East Program: Gulf Analysis Paper, Feb 2011, http://csis.org/files/publication/110222_Gulf_Analysis_Scarcity_and_Strategy_in_the_GCC.pdf (accessed Mar 14, 2011), 2.

[180] "Water Scarcity," *United Nations*.

water resources, several states are well below this level with Kuwait, Qatar, Saudi Arabia, United Arab Emirates (UAE), and Yemen all having just $100m^3$ available while Bahrain is slightly better off with $160m^3$ and Oman has $400m^3$.[181] However, many of these states get a majority of their water from other sources. For Qatar, Saudi Arabia, and UAE the vast majority of their total water resources available come from nonrenewable groundwater.[182] The nonrenewable sources provide a huge reserve of water, but they are being depleted at a rapid rate. While almost every country on the Arabian Peninsula uses much more water than is renewed annually, Saudi Arabia, UAE, and Kuwait provide startling examples of just how much nonrenewable water is used. Saudi Arabia uses almost 8.5 times more water than is renewable, UAE uses more than 15 times, and Kuwait uses 22 times more water than is renewable each year.[183] With these totals in mind, it is no wonder that many fear that there is a severe over reliance on nonrenewable groundwater. A clear example of this problem occurred in the 1990s when one aquifer under Riyadh had become so deep it could no longer be pumped.[184]

Desalination is used extensively to make up for shortfalls in the water supply and countries in the region have devoted massive resources to this undertaking. The UAE has spent up to $4 billion a year on the production of desalinated water while Saudi Arabia spent about $17 billion building desalination plants up to 2008 with a recent addition of a $4 billion plant.[185] Power plants and desalination plants are often combined together and the linked plants in Saudi Arabia account for more than half of the country's domestic oil consumption.[186] From these massive investments, desalination in the UAE and Saudi Arabia, the two largest producers of desalinated water, provide hundreds of millions of m^3 of water, but it is still not enough to meet demand. As the data provided in the

[181] World Bank, "Making the Most of Scarcity," 162, 172, 178, 180, 182, 188, and 192.

[182] Ibid., 143.

[183] Ibid., 145.

[184] Jon B. Alterman and Michael Dziuban, "Clear Gold: Water as a Strategic Resource in the Middle East," *Center for Strategic & International Studies*, A Report of the CSIS Middle East Program, Dec 2010, http://csis.org/files/publication/101213_Alterman_ClearGold_web.pdf (accessed Mar 14, 2011), 10.

[185] Dziuban, "Scarcity and Strategy," 2.

[186] Alterman and Dziuban, "Clear Gold," 3.

previous paragraph indicates, even with the huge influx of freshwater desalination creates, nations are still heavily relying on other sources, so clearly desalination is currently not even close to freeing these nations from their dependence on nonrenewable groundwater. Desalination is the great hope for the region, but even as desalination capacity grows, the demand for water in the region grows even faster.[187] In Saudi Arabia, demand for water has increased by 500 percent in the last 25 years and is expected to increase by another 200 percent in the next 20.[188] Abu Dhabi's water demand has doubled in the last decade.[189] Kuwait's current daily water consumption totals come to within one million gallons of its total capacity, which even with the addition of planned construction, will not be able to meet demand into 2013.[190]

There are several reasons that demand for water continues to rise at increasing rates despite the great cost and depleting groundwater in the peninsula. The great inefficiency of use in the region is mostly due to the political nature water holds in the region. While the impacts of this political outlook on water are discussed in the next section, here the focus is on the effects from the general idea that abundant oil wealth among the countries of the GCC have allowed governments to make water seem plentiful. As a result, both people and governments treat water as an infinite resource despite its great scarcity. In these countries, large subsidies keep the price of water either free or significantly below its value, and as a result, users tend to demand it even more intensely.[191] The major result from this is that many nations have attempted to create a condition of food self-sufficiency or food security and agriculture is used extensively in the region.

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[187] "Business Begins to Stir," *The Economist: A Special Report on Water*, May 22, 2010: 5–7, 6.

[188] John Vidal, "What Does the Arab World do when its Water Runs Out?," *The Observer*, Feb 20, 2011, http://www.guardian.co.uk/environment/2011/feb/20/arab-nations-water-running-out (accessed Mar 15, 2011).

[189] Dziuban, "Scarcity and Strategy," 3.

[190] Habib Toumi, "Kuwait Could Face Water Crisis," *Gulfnews.com*, Sep 08, 2010, http://gulfnews.com/news/gulf/kuwait/kuwait-could-face-water-crisis-1.678675 (accessed Marc 15, 2011).

[191] Dziuban, "Scarcity and Strategy," 3.

Attempts at creating so-called food security, which in this case is really a function of water security, is really a matter of semantics. Security is ensuring sufficient physical and economic access to water, while self-sufficiency is the attempt to satisfy needs through domestic production.[192] There is strong political motivation for the countries in the peninsula to attempt, or at least make the appearance, of attempting to achieve self-sufficiency. To this end, extremely wasteful and inefficient water practices have been put in place. Despite the arid conditions, and more efficient ways of obtaining water, which are detailed shortly, the so-called "green revolution" that peaked in the 1980s and 90s resulted in dramatic changes in the region. Massive resources were devoted to agriculture and irrigation expanded dramatically. In just over 45 years, Qatar expanded its arable land 18 times while UAE and Kuwait expanded theirs more than 14 times.[193] Saudi Arabia quadrupled its food production and became the world's sixth-largest exporter of wheat.[194] These undertakings severely depleted the region's groundwater sources, and while steps were taken to slow these trends, the inefficient use of water continues. While desalinated water is expensive, only 25 percent is used for drinking and sanitation in Abu Dhabi, with the rest going to domestic landscaping, industry, and other uses.[195] While the Saudis have aimed to phase out wheat production, many wheat farmers have merely switched to growing fodder crops that require from 4 to 16 times more water than wheat.[196] Saudi Arabia also still runs the world's largest integrated dairy farm, where 2,300 gallons of water are needed to produce each gallon of milk.[197] Agricultural products often are sold at 30% of actual production costs in order to be

[192] "Implications of Economic Policy for Food Security: A Training Manual," *FAO Corporate Document Repository*, http://www.fao.org/docrep/004/x3936e/X3936E03.htm (accessed Mar 15, 2011).

[193] Dziuban, "Scarcity and Strategy," 2.

[194] Ibid.

[195] Alterman and Dziuban, "Clear Gold," 3.

[196] Ibid., 11.

[197] Ibid., 10.

competitive with foreign imports.[198] As a result, of all these inefficiencies, agriculture makes up 70 percent of water use in the GCC while contributing less than 1 percent to GDP.[199]

Related to this idea of dependence on agriculture is the concept of virtual water. Virtual water is the water contained within products, especially wheat, that when imported, allow nations to endure despite their scarce water resources by taking water from areas of abundance.[200] The specific value of virtual water is difficult to calculate because required water inputs can vary greatly from place to place, but the concept is valid for showing the relative costs of water or the amount of water shortfalls present in a region through how much virtual water they import.[201] With this in mind, in spite of the great regional attempts to promote agriculture, the countries of the Arabian Peninsula still effectively import a large quantity of water through food. Saudi Arabia leads the region in the importation of virtual water, importing the equivalent of more than 13 billion m^3 of water, which is more than 500 m^3 for each person in the country.[202] Other nations import significantly less due to their smaller populations, but as far as virtual water relative to population size UAE leads the way with an astounding 975 m^3 of water imported for each citizen.[203] The importation of water itself is certainly not a bad thing, and in fact is an effective means of obtaining water at an efficient cost. This is especially true when comparing the cost of desalinated water, at about 50 cents for each m^3 at the low end, with water that is obtained for about 7 cents per m^3 in other parts of the world.[204] However, by importing virtual water, countries on the Arabian Peninsula are effectively

198 Neil Ford, "Gulf Water: A Multi Billion Dollar Business," *The Middle East*, no. 328 (Nov 2002): 46–49, 47.

199 Dziuban, "Scarcity and Strategy," 4.

200 Allan, *Middle East Water Question*, 33.

201 "Trade and Conserve," *The Economist: A Special Report on Water*, May 22, 2010: 12–13, 13.

202 World Bank, "Making the Most of Scarcity," 182.

203 Ibid., 188.

204 Hillel Shuval, "The Role of Virtual Water in Water Resources Management in the Arid Middle East. A Re-evaluation of Water Food Security," *Water & Energy in the Middle East: Conflicting Interests and Cooperative Approaches, Workshop Report*, Forum 2000, Jul 12-14, 2006, https://www.forum2000.cz/files/200001674-d098ad1927/_4A_.pdf (accessed Mar 15, 2011).

able to allow previous assumptions about the infinite quantity of water to continue and continue to act politically as if they do not have a water shortfall even as these deficits grow.[205]

Another method used in the region in an attempt to achieve food security is to purchase or lease land in other, usually less developed, nations and import the food grown there. Essentially, countries that export capital but import food outsource their food production to states that need capital but have land, and water, to spare.[206] Instead of buying food, and the virtual water contained within it, countries obtain land abroad, grow food there, and ship it back home. Several states on the peninsula have taken part in these arrangements with Sudan alone providing 400,000 hectares of land for UAE and setting aside a total of one-fifth of all arable land in the country for Arab governments.[207] Saudi Arabia, Kuwait, Qatar, and others have explored or participated in these deals, not just in Africa, but in Australia, South America, Asia, and Eastern Europe as well. While these arrangements are technically about procuring arable land, they also include the water that goes along with it, and for the countries of the Arabian Peninsula, the water is the most valuable part.[208] These land, and water, deals, represent further attempts at providing water security for the region, and are another indication of how scarce water is on the Arabian Peninsula despite the actions and attitudes of the people and governments that reside there.

C. THE POLITICS OF WATER IN THE ARABIAN PENINSULA

Much of this paper to this point has focused on the possibility of conflict between states over scarce water resources but, in the Arabian Peninsula at least, "the most important water scarcities and conflicts are located within, rather than between, states and social formations."[209] Despite the massive importation of virtual water on the world

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[205] Allan, *Middle East Water Question*, 239.

[206] "Outsourcing's Third Wave," *The Economist: Buying Farmland Abroad*, May 21, 2009, http://www.economist.com/node/13692889 (accessed Mar 15, 2011).

[207] Ibid.

[208] Ibid.

[209] Selby, Geopolitics of Water, 331.

market and the outsourcing of food production to obtain water resources from abroad, the nations of the peninsula still are quickly depleting their groundwater and fast outpacing their ability to produce water expensively through desalination. The great inefficiency of devoting massive water resources to agricultural and other wasteful purposes is all an effort to maintain the illusion that water is still readily available in order to maintain political control in the region. Water has so far had little impact on stability or been a cause of unrest, but current water practices are not sustainable. Without water, the stability of the region and the durability of the current governments could be severely jeopardized.

The political situation in much of the Arabian Peninsula is that the countries use their plentiful resource—oil, and the money it provides—in order to provide the water that is scarce. Essentially, these governments are turning oil into water.[210] Even in those nations without significant oil wealth, such as Yemen, in the absence of concerted government development, water keeps people tied to their land and provides a way to make a living. Governments have long used water as a political tool. Many in the region have used large tracts of arable land and water to cement political alliances. For all governments, the ability to provide food, water, fuel, electricity, and other essentials assures the consent of the governed. Essentially, government subsidies and inexpensive goods and services are exchanged for political support.[211] Efforts at importing water through the open market or land deals in other countries does bring water in, and desalination provides extra resources, but the cost of producing water is growing beyond the ability of governments to provide for, and groundwater is rapidly disappearing. Countries will increasingly find it more difficult to provide both water and energy at the same time.[212]

Of course, the states of the Arabian Peninsula may not completely exhaust their groundwater or overrun their capacity for desalination, but as assumptions about the unlimited and free nature of water begin to change, so too will the assumptions about the

[210] Dziuban, "Scarcity and Strategy," 3.

[211] Alterman and Dziuban, "Clear Gold,"5.

[212] Dziuban, "Scarcity and Strategy," 5.

governments of these countries.[213] These changes do not come from the region's environment, which has always been arid and water scarce, but instead from the leadership's ability to continue its current path of water management.[214] The loss of groundwater resources, or the inability to provide enough desalinated water, cannot be blamed on droughts or outside intervention and instead provide a direct challenge to the state's ability to maintain control.[215] Supplying water has been a symbol of the power of the state and its strength to provide even in an area of paucity. The loyalties secured through water would no longer be safe. As water becomes expensive or unavailable, the authority of the government will be challenged. Facing a lack of water would be a new experience for those who have never been without, and they may have no choice but to protest this new threat to their welfare.[216] As efforts to provide cheap and abundant water throughout the region fail, societies through the area will be negatively affected and the stability of the region will be disturbed.[217]

Freshwater scarcity not only threatens the sustainability of the natural resource base it also affects all economic sectors, contributes to poverty and urbanization, and stresses government institutions.[218] As water sources are depleted, those who depended on water, either for agriculture or domestic supplies, will be forced to migrate in an attempt to find more. Additionally, tensions between those with claims to certain water resources, or of those who expected to receive certain water subsidies from the government, will heighten. These people will feel their government has let them down. When groundwater is depleted, there will be little reason to accept the durability of any government-proposed solution to the problem.[219] Situations similar to these have occurred in the past, where the perception existed that the state was not fulfilling its

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[213] Dziuban, "Scarcity and Strategy," 1.

[214] Russell, "Environmental Security and Regional Stability," 98.

[215] Alterman and Dziuban, "Clear Gold," 11.

[216] Ibid., 8.

[217] Russell, "Environmental Security and Regional Stability," 90.

[218] "Coping with Water Scarcity: A Strategic Issue and Priority for System Wide Action," *UN-Water Thematic Initiatives*, Aug 2006, ftp://ftp.fao.org/agl/aglw/docs/waterscarcity.pdf (accessed Mar 15, 2011).

[219] Alterman and Dziuban, "Clear Gold," 7.

responsibility to provide for its people. However, while these conditions could be addressed in the past by reversing the circumstances that led to the unrest, water would present a different case.[220] Water shortages could prove to be completely irreversible and the unrest unstoppable. Recent events in the Middle East have shown the potential power behind the social unrest that comes from unmet government promises. Instability would be the result of this situation where vast constituencies can no longer be co-opted through the inexpensive and inexhaustible supply of water.

D. CONCLUSIONS

Water resources in the Arabian Peninsula are extremely stressed. Groundwater is being depleted at a rapid rate and desalination is expensive and having difficulty keeping up with rising demand. Importing virtual water, either through the market or through land deals with other countries, provides an efficient source of water. Desalination also provides additional supplies. However, because regional practices continue to be wholly inefficient and wasteful, the potentially efficient means of obtaining water simply provide a way of masking the severe scarcity in the region. Governments of the region find it politically necessary to maintain the illusion that water is both plentiful and inexpensive in an attempt to keep their political strength in place and their alliances intact. However, as water supplies dwindle and countries are increasingly unable to meet the high water demand there will be severe political repercussions. Water has long been used as a tool of achieving the consent of the governed. When water becomes increasingly scarce or expensive, which is inevitable if current practices continue, people will no longer be docile. Problems such as migration and political alienation will have a negative effect on the stability of the region as the glue that holds together the relationship between state and population comes undone.

[220] Alterman and Dziuban, "Clear Gold," 7.

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VI. CONCLUSIONS AND RECOMMENDATIONS

Water, after all, is used to extinguish fires, not to ignite them.

—Munther J. Haddadin[221]

Water is essential. Aside from the obvious need for drinking, water is critical to industry, economies, development, health, religion, and every other conceivable aspect of life. The world's supply of freshwater is abundant, but many areas face shortages. These scarcities can be the result of either natural or manmade conditions, and in the Middle East both of these causes are present. However, despite the rhetoric and writings of the water pessimists, competition between states that share the Jordan, Tigris, and Euphrates Rivers have largely not resulted in violent confrontations. Instead, the countries have essentially worked to share the water resources from these rivers, and this cooperation has only gotten stronger as time has passed. Unfortunately, this trend toward cooperation and away from unrest does not necessarily hold true when it comes to domestic water issues. The countries on the Arabian Peninsula are currently managing their scarce water resources in a way that is unsustainable. This condition could lead to civil unrest and instability in the future.

Optimists and pessimists both look at the same situations and make opposing conclusions. Pessimists feel that competition for scarce water resources leads to conflicts over its control. This idea means that water scarcity has been at the root of conflicts in the past and, as populations and demand for water continues to increase, so too will the incidents of international violence. Pessimists see a trend of escalating conflict continuing into the future where water wars will dominate the region. However, the pessimistic outlook is flawed, both in theory and application. Optimists see water scarcity increasingly leading to cooperation. The pessimistic outlook tends to view circumstances very narrowly, looking only at water's effect on outcomes. However, when viewed through a wider lens, it becomes clear that water has not been a central component of past conflicts in the Middle East. Instead, water has lead to cooperation.

[221] Haddadin, "Water in the Middle East Peace Process," 337.

Conflict would be a wholly inefficient, expensive, and ineffective means of obtaining access to water. Cooperation, on the other hand, provides benefits to all those who choose to participate. Sharing water is not a zero sum game, and the states of the Middle East have much to gain by cooperating over their shared water resources.

The countries that share the Jordan River and its waters have supposedly fought over water several times in the past, and have been singled out as a potential location for future water wars. However, the history simply does not support this idea. While the region certainly has a long history of violent conflict, these clashes have not had water at their core. Instead, regional rivalries and long-standing tensions between the nations have been the cause of violence. Water has provided a means of cooperation between these states even when tensions on other matters have been high. Even in times of drought, when pessimists believe water wars are most likely, the region has instead looked to conservation and cooperation. Far from being a cause of wars in the Jordan River Valley, water has been a pathway to cooperation.

The situation is similar for the states that share the Tigris and Euphrates Rivers. While downstream nations have complained about the actions of those upstream, and violence has nearly broken out in the region, water has not caused the violence that so many have predicted. Even without a comprehensive water-sharing agreement between those who share these rivers, agreements have been made and upheld that allow for the continued use of both rivers. Despite the rhetoric associated with water use in the region, violence has not broken out between these nations. Efforts at cooperation, however, have been widespread and ongoing. Current conditions in the region only promise more cooperation in the future. Instead of wars over water, the water resources of the Tigris and Euphrates have been a source of collaboration and will only lead to more cooperation in the future.

Unlike the role of international waters of the Jordan, Tigris, and Euphrates, the domestic water issues facing the states of the Arabian Peninsula have the potential to be destabilizing. Water scarcity is not a new issue to these countries; however, their current water management practices cannot be continued. The region already receives a large portion of its water through importing virtual water, and many countries have added to

this by obtaining land abroad for the sole purpose of importing the food, and the water contained within it. In additional, desalination provides millions of additional m^3 of water. However, even with these supplementary water sources, the region continues to use groundwater at an alarming rate. Once these groundwater sources are depleted, they are gone. Arable land and water have been used as a tool to cement political alliances and pacify the populations of these nations, and without the groundwater they depend on, migration and political alienation could pose significant problems. When groundwater becomes expensive, or is depleted, the governments could find their authority challenged and, as a result, unrest and instability could break out in the region.

The three regions detailed in the case studies throughout this paper do not need to remain in their current situation. Much can be done to improve all these conditions. The foremost among these is improved knowledge. Despite all the attention water receives, there are still many factors that are unknown or unclear. River flows are contested between Turkey, Syria, and Iraq as well as the countries that share the Jordan. Knowledge of groundwater reserves is incomplete in the Jordan Valley as well as the Arabian Peninsula. For international waterways, more detailed knowledge will allow stronger agreements and better cooperation between the nations that share the resource. For groundwater, accurate accounts of withdrawals and remaining supplies will help inform users of the impact they are having, as well as to provide information about just how long current practices can be maintained. Joint monitoring stations, like those set up along the Tigris and Euphrates, are a good way to improved knowledge, but they need to be more widespread. All nations involved would benefit from the knowledge these stations would provide, and the information obtained would be essential in creating further cooperation. Groundwater reserves need to receive increased attention if their true limits are to be understood.

Large international agreements are generally ineffective in providing management for individual river basins. However, smaller, regional arrangements have proven their ability to manage the situations unique to each area. Currently, no basin-wide management schemes exist for either the Jordan or Tigris/Euphrates. Like any other arrangement that places limits on national sovereignty, these deals can be hard to reach.

However, the international framework provided by the United Nations' Convention on the Law of the Non-Navigational Uses of International Watercourses could be the basis for these agreements. Indeed, organizations like the United Nations can make regional agreements more likely, not just by providing the overall structure for these more targeted arrangements, but also by actively pursing regional arrangements. To be truly effective, regional schemes will need a means of enforcement. While regional rivals are unlikely to agree to a tough enforcement mechanism enforced by one another, they may be more likely to agree if a larger international group provided oversight.

Cooperation over water between nations can easily lead to cooperation in other areas. This principle has been recognized widely in the military realm, where military exercises and other forms of working together provide an important tool in national diplomacy. This idea can easily use water concerns as a tool for further consideration. Implicit in this is that states today see a much wider view of national security than is often recognized, especially with regard to environmental security. The United States already leads cooperative exercises based on environmental security in the CENTCOM area of operation. Exercises such as these can foster cooperation without being nearly as threatening as normal military actions. Normally, these types of cooperation are associated with large disaster relief situations but, since international waterways face many dangers and have the ability to affect all states that share the waters, these waters could provide fertile ground for this type of cooperation and the benefits that come from it.

More efficient use is important to the management of all water resources and can eliminate many potential sources of conflict. However, this is most important in the Arabian Peninsula. Clearly, the renewable water resources in the region are very scarce. However, these shortfalls can be completely made up for by importing virtual water. Even when the open market does not supply adequate supplies of imports, the land deals obtained overseas can still provide adequate water. Desalination can make up for any other shortfalls. However, instead of relying on these efficient and effective methods of obtaining water, the region largely uses these supplemental forms of water to mask their scarcity for political reasons. However, the political uses of water could result in long-

term political unrest. Instead, difficult decisions must be made. The use of groundwater must be scaled back. This can be accomplished through various means, including effective monitoring of groundwater use, more effective water pricing, giving up on ideas of food self sufficiency masked as food security, more efficient agricultural methods, and many others. However, it is important that the political ramifications from the implementation of water saving measures taken over time, and in a careful, thought out manner, may cause some problems. However, these problems are much less severe than those that will happen suddenly when groundwater use is no longer possible due to depletion.

No one can tell the future, of course, so we do not know if the trends outlined in this paper will continue. However, by realizing the power water holds, states can go a long way toward ensuring water is used effectively. It can provide a strong impetus toward cooperation between countries, even when other relations are not good and even in times of elevated need. It can also become a means of creating instability and unrest within a country. There are many possible solutions to the problems presented by water, from the most aggressive military action to the greenest, most ecological actions taken for preservation. The most important quality of water for all nations to understand is that water is a finite resource and there are great benefits to be had by all who work to share it effectively and manage it efficiently.

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